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653307
Sup. Ct.

TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1944

No. 486

THE HOOVER COMPANY, PETITIONER,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA

PETITION FOR CERTIORARI FILED SEPTEMBER 20, 1944.

CERTIORARI GRANTED NOVEMBER 6, 1944.

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE DISTRICT OF COLUMBIA.

Appeal No. 8602.

THE HOOVER COMPANY,
Plaintiff-Appellant,

vs.

CONWAY P. COE, Commissioner of Patents,
Defendant-Appellee.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA. HON. DANIEL W. O'DONOGHUE, JUDGE.

APPENDIX TO BRIEF FOR APPELLANTS.

IN THE UNITED STATES COURT OF APPEALS

FOR THE DISTRICT OF COLUMBIA.

THE HOOVER COMPANY, *Appellant,*		
vs.		Civil Action
CONWAY P. COE, Commissioner of Patents, *Defendant.*		No. 15,028

STATEMENT OF CONTENTS OF APPENDIX OF APPELLANT'S BRIEF.

Pursuant to the provisions of Rule 17(d) of the United States Court of Appeals for the District of Columbia, appellant herewith sets forth the subject matter which he proposes to place in the appendix of his brief.

Dated Chicago, Illinois, September 9, 1943

IN THE UNITED STATES DISTRICT COURT,

For the District of Columbia.

The Hoover Company,
Plaintiff,

v.

Conway P. Coe, Commissioner of Patents,
Defendant.

In Equity No.

COMPLAINT.

To the Honorable Judges of the United States District Court for the District of Columbia:

1. The jurisdiction of this court is based upon the patent laws of the United States and in particular Revised Statutes Sec. 4915.

2. Plaintiff, The Hoover Company, is an Ohio corporation, a resident of North Canton, County of Stark, State of Ohio, and is the assignee of the entire right, title and interest in and to application for United States Letters Patent, Serial No. 373,970, filed by Curtis C. Coons on January 10, 1941 for a new and useful Improvement in Continuous Absorption Refrigerating Systems and hereby makes profert of that application.

3. Defendant, Conway P. Coe, is the Commissioner of Patents of the United States, a legal resident of the District of Columbia, and is sued herein as Commissioner of Patents of the United States.

4. Application Serial No. 373,970 was duly filed in the United States Patent Office in accordance with the laws of the United States and the rules of the Patent Office on January 10, 1941 as a reissue application of United States

Letters Patent No. 2,178,870, granted November 7, 1939 to The Hoover Company as assignee of the entire right, title and interest of the inventor, Curtis C. Coons, on an application Serial No. 94,934, filed August 8, 1936, and entitled Improvements in Continuous Absorption Refrigerating Systems.

5. The inventor, Curtis C. Coons, assigned his entire right, title and interest in and to the invention and his application Serial No. 94,934 by a properly executed assignment dated June 30, 1936, which assignment was recorded in the United States Patent Office on August 8, 1936 at Liber S 167, page 462.

6. The reissue application, Serial No. 373,970 was duly prosecuted in the United States Patent Office in accordance with the laws of the United States and the rules of the Patent Office.

7. The reissue application was passed upon by the Primary Examiner who allowed sixteen claims but refused to allow the following claims:

> 15. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.
>
> 16. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and a heat exchanger, said exchanger being connected to conduct vapors and

liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

38. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a three-part heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

39. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and heat exchange means, said exchange means being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchange means also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a vapor portion of said heat exchange means to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit.

8. Claim 15 *supra* is Claim 7 of the United States Letters Patent to Bergholm 2,201,362, and Claims 16, 38 and 39 *supra* are based upon Claim 7 of the Bergholm patent.

9. The Bergholm patent No. 2,201,362 was granted May 21, 1940 to Servel, Inc. of New York, N. Y., a corporation of Delaware, as the assignee of Harry K. Bergholm, the inventor on an application for United States Letters Patent, Serial No. 175,632 filed November 20, 1937, entitled Improvements in Refrigeration.

10. The relationship of Claims 15, 16, 38 and 39 to the Bergholm patent was pointed out to the Examiner and an interference was requested.

11. The Examiner rejected Claims 15, 16, 38 and 39 on the ground that they were not supported by the disclosure of the reissue application and refused to set up an interference between the reissue application and the Bergholm patent.

12. An appeal was taken from the final rejection of the Primary Examiner to the Board of Appeals which affirmed the rejection of the Primary Examiner as to all of the appealed claims on October 6, 1941, holding that said Claims 15, 16, 38 and 39 were not readable upon the disclosure of the reissue application, Serial No. 373,970.

13. No appeal to the Court of Customs and Patent Appeals has been taken from the decision of the Board of Appeals.

14. Plaintiff avers that Claims 15, 16, 38 and 39 are readable upon the disclosure of the reissue application in the same manner in which they are readable upon the Bergholm patent 2,201,362.

15. Plaintiff hereby avers, and it was so alleged in application Serial No. 373,970 as filed, that the invention therein disclosed and claimed is new and useful and was not known or used by others in this country before Coons' invention thereof, and was not patented or described in any printed publication in this or any foreign country

before Coons' invention thereof or more than two years prior to the filing date of the original application, Serial No. 94,934 and that the invention was not in public use or on sale in this country for more than two years prior to said original application, and was not patented in any foreign country by Coons or his legal representatives or assigns on an application filed more than twelve months prior to the said original application for United States Letters Patent and that the invention was never abandoned.

16. Wherefore the plaintiff prays that the Honorable Court decree that the Commissioner of Patents be directed to find that Claims 15, 16, 38 and 39 are readable upon the disclosure of plaintiff's application and allowable to him.

R. R. FITZSIMMONS,
W. D. SELLERS,
Attorneys for Plaintiff.

State of Illinois,)
County of Cook.) ss:

H. Earl Hoover, being first duly sworn deposes and says that he is the Vice President of The Hoover Company, a corporation, and the plaintiff named in the Complaint herein; that he has read the above and foregoing Complaint, and that the facts asserted therein are true.

H. EARL HOOVER,
Vice President.

Subscribed and sworn to before me this 2nd day of March, A. D. 1942.

MILDRED B. ELSNER,
Notary Public.

Attorneys' Address:
8 South Michigan Avenue,
Chicago, Illinois.
Local Solicitor:
Elmer Stewart,
National Press Building,
Washington, D. C.

The Hoover Company,
Plaintiff,

v.

Conway P. Coe, Commissioner of Patents,
Defendant.

Civil Action,
No. 15,028.

W. W. Cochran, Solicitor,
United States Patent Office,
Attorney for Defendant.

ANSWER TO THE COMPLAINT.

To the Honorable the Justices of the District Court of the United States for the District of Columbia:

1, 2. Defendant admits the allegations of paragraphs 1 and 2.

3. He admits the allegation of his official position and that he is sued in his official capacity. He denies that he is a legal resident of the District of Columbia, his legal residence being in the State of Maryland. He states that his official residence is in the District of Columbia.

4, 5, 6. He admits the allegations of paragraphs 4, 5 and 6.

7. He admits the allegations of paragraph 7.

8. He admits that claim 15 of the application of Curtis C. Coons, No. 373,970, for reissue of patent No. 2,178,870, which application was filed in the Patent Office on January 10, 1941, and entitled "Continuous Absorption Refrigerating System", is substantially like claim 7 of the U. S. patent to Bergholm, No. 2,201,362. He states that claim 15, as set out in paragraph 7, differs from claim 7 of the Bergholm patent in that the word "heat", which occurs in line 11 of claim 7 of the Bergholm patent, is omitted

from plaintiff's claim 15. He admits that claims 16, 38 and 39 of plaintiff's application, which claims are as set out in paragraph 7, bear some similarity to claim 7 of the Bergholm patent.

9, 10, 11, 12, 13. He admits the allegations of paragraphs 9 to 13, inclusive.

14. He denies that claims 15, 16, 38 and 39 of plaintiff's application are readale upon the disclosure of said application and therefore denies that plaintiff is lawfully entitled to receive a reissue patent containing any of said claims, as will more fully appear from the statement of the examiner in answer to the appeal and the decision of the Board of Appeals, copies of which will be furnished at the trial.

15. He admits that in said reissue application the applicant Curtis C. Coons made averments corresponding to the allegations of paragraph 15, but denies, for reasons aforesaid, that such allegations would justify the granting of a reissue patent containing any of claims 15, 16, 38 and 39 of said application.

16. Paragraph 16 is a prayer to the Court which defendant is not required to answer.

W. W. COCHRAN,
Solicitor, U. S. Patent Office,
Attorney for Defendant.

April 24, 1942.

I hereby certify that a copy of this Answer to the Complaint was mailed today, April 24, 1942, to the attorney for plaintiff, Elmer Stewart, National Press Building, Washington, D. C.

W. W. COCHRAN,
Solicitor.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company,
Plaintiff,
v.
Conway P. Coe, Commissioner of Patents,
Defendant.

Civil Action
No. 15,928.

FINDINGS OF FACT.

1. This is a suit brought under the provisions of Section 4915 R. S. (U. S. C. Title 35, Section 63) in which the plaintiff, The Hoover Company, seeks to have this Court adjudge that it is entitled to receive a reissue patent on the application of its assignor, Curtis C. Coons, No. 373,970; containing claims 15, 16, 38 and 39.

2. Claim 15 is a copy of claim 7 of the patent to Bergholm, No. 2,201,362, and claims 16, 38 and 39 are modified forms of certain claims of the Bergholm patent. These claims were presented for the purpose of having an interference instituted between the application of Coons and the patent to Bergholm.

3. The patent to Bergholm, No. 2,201,362, discloses a refrigerating system of the absorption type, in Figure 1 of which is shown a generator 10, wherein a mixture of ammonia and water is heated in coil 30, the ammonia vapor with slugs of water passing to the upper portion of the generator, where they are separated. The ammonia vapor flows through conduit 31, vessel 28, conduit 27, the outside passage 25 of a concentric arrangement of three pipes and conduit 26 to the condenser, where the ammonia vapor is condensed into a liquid. This liquid flows into the upper end of the evaporator 16 where the vapor is evaporated and diffused into hydrogen gas, producing a refrigerating

effect. The mixture of the ammonia vapor and the hydrogen gas flows from the upper end of the evaporator through the inner passage of a heat exchanger 21 to the lower end of the absorber. The weakened absorbent liquid flows from the lower part of the generator through conduit 34, the inner passage 23 of the three-pipe arrangement, and conduit 35, and the lower part of the absorber 13, into vessel 14. From vessel 14 the enriched absorption solution flows through the conduit 32, the middle passage 24 of the three-pipe arrangement, conduit 33 and the lower part of conduit 31 in reservoir 28. From the latter the enriched absorption solution flows back to the heating coil 30 and where again the ammonia is boiled off. The patentee, in his patent designated the arrangement of the concentric pipes as "a triple heat exchanger". In it, the refrigerant vapor passing from the generator to the condenser is in heat exchange relation with the enriched absorption solution passing from the absorber to the generator and the latter is simultaneously in heat exchange relation with the weak absorbent solution passing from the generator to the absorber. The "triple exchanger" is located below the surface level of the liquids in both the generator and the absorber.

4. The reissue application of Coons discloses a refrigerating system of the absorption type, in Figure 1 of which there is disclosed a generator which includes boiler B, to which heat is supplied which drives the refrigerant out of a solution of ammonia and water. The ammonia vapor boils off and carries through the pipe 11 slugs of the solution into a separating chamber S, from which chamber the ammonia vapor passes through conduits to a rectifier R and condenser C, where it is condensed to a liquid. This liquid passes to an evaporator where the liquid is evaporated by diffusing through an inert gas, producing the desired refrigeration. The mixture of ammonia and the

gas passes into the lower end of the absorber A. The weakened solution passes from the gas separator into the upper end of the absorber. The weakened absorption solution, in passing through the absorber absorbs the ammonia from the mixture of ammonia and inert gas. From the absorber the liquid flows through a conduit 23, rectifier R and a conduit 25, to a reservoir 24 and from that reservoir through a conduit 26 into the boiler B, where the ammonia vapor is again boiled off. The strong absorption solution, in passing from the absorber to the boiler, is in heat exchange relation with the weak solution in two places; one, where the conduits 23 and 22 are in heat exchange relation and, two, where conduits 26 and 22 are in heat exchange relation. The strong solution also passes in heat exchange relation with ammonia vapor in rectifier R. The application, therefore, discloses three heat exchangers. There are two liquid levels in the generator, one in the boiler and one in the separator.

5. The Coons reissue application, No. 373,970, does not disclose "a triple heat exchanger" as called for in claim 15, nor does it disclose "a three-part heat exchanger" as called for in claim 38. It describes specifically three separate heat exchangers.

6. The Coons reissue application does not disclose an arrangement in which "a heat exchanger", as called for in claims 15, 16 and 38, or "heat exchange means" as called for in claim 39, is located below the surface level of liquid in both the generator and the absorber, since it discloses three separate heat exchangers and these heat exchangers are above, and not below, the surface level of liquid in the boiler B of the generator of the Coons application.

7. The applicant Coons has no right to make, in his application, any of the claims 15, 16, 38 and 39, since they are not readable on the disclosure of his application.

CONCLUSIONS OF LAW.

1. In determining whether an applicant has a right to make a claim of a patent, or a modified form of the claim of a patent, copied for interference purposes, his right to make those claims is not established by the mere fact that certain of the elements of the applicant's device are equivalents, within the meaning of that term as used in infringement proceedings, to certain elements of the device of the patent. The applicant has no right to make such claims unless they are directly readable upon his disclosure.

2. The plaintiff, The Hoover Company, is not entitled to a patent on the reissue application of Curtis C. Coons, containing claims 15, 16, 38 and 39, or any of them.

3. The complaint should be dismissed with costs against the plaintiff.

.....

Justice.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company,
Plaintiff,

v.

Conway P. Coe, Commissioner of Patents,
Defendant.

No. 15028.
Civil Action

JUDGMENT.

This action came on to be heard at this term and thereupon, upon consideration thereof, it is this 21 day of June, 1943

Adjudged that the complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

DANIEL W. O'DONOGHUE,
Justice.

Approved as to form:

.....
Attorney for Plaintiff.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company, *Plaintiff*, v. Conway P. Coe, Commissioner of Patents, *Defendant*.	Civil Action No. 15,028.

NOTICE OF APPEAL.

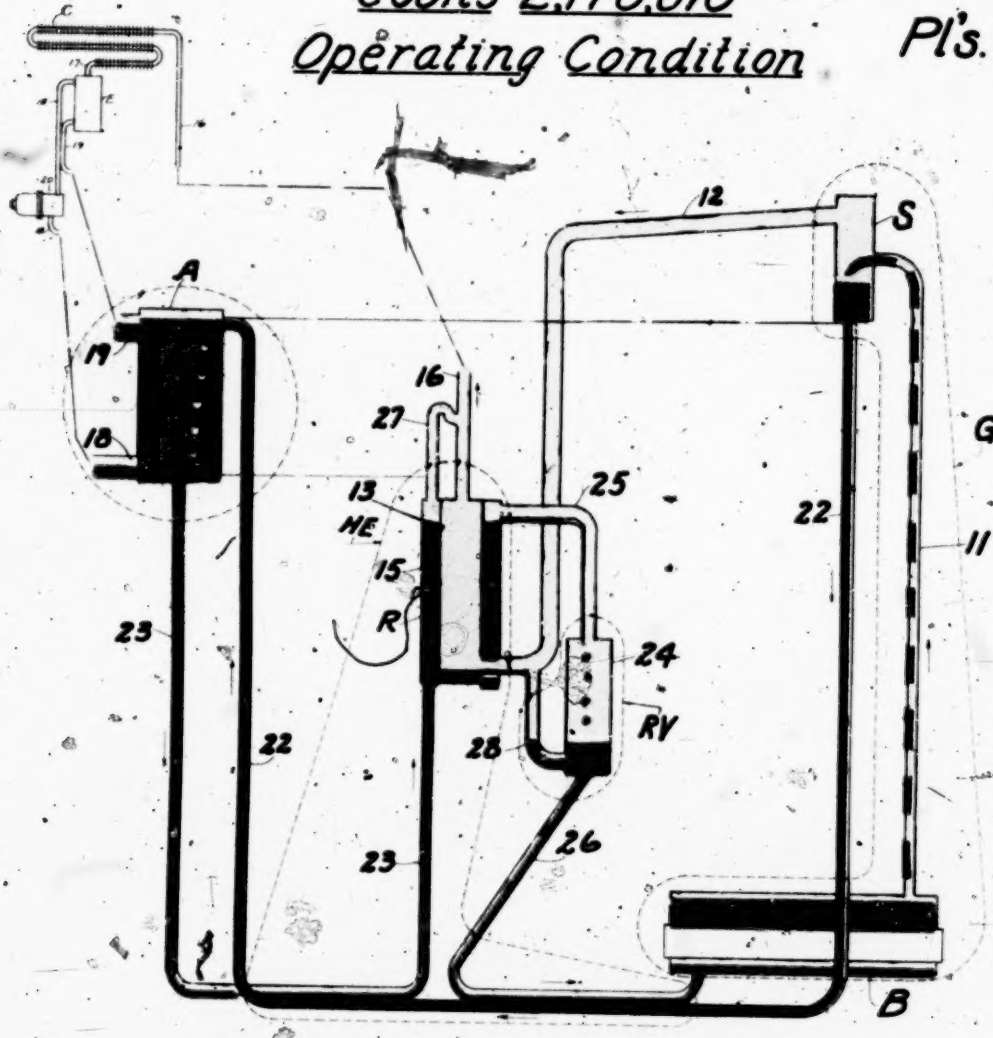
Notice is hereby given this 7th day of July, 1943, that The Hoover Company, Plaintiff, hereby appeals to the United States Court of Appeals for the District of Columbia from the judgment of this Court entered on the 21st day of June, 1943, in favor of the Defendant against said Plaintiff, The Hoover Company.

Signed W. D. Sellers,
Attorney for
The Hoover Company.

Coons 2,178,870

Operating Condition

Pl's. Exh. No.1

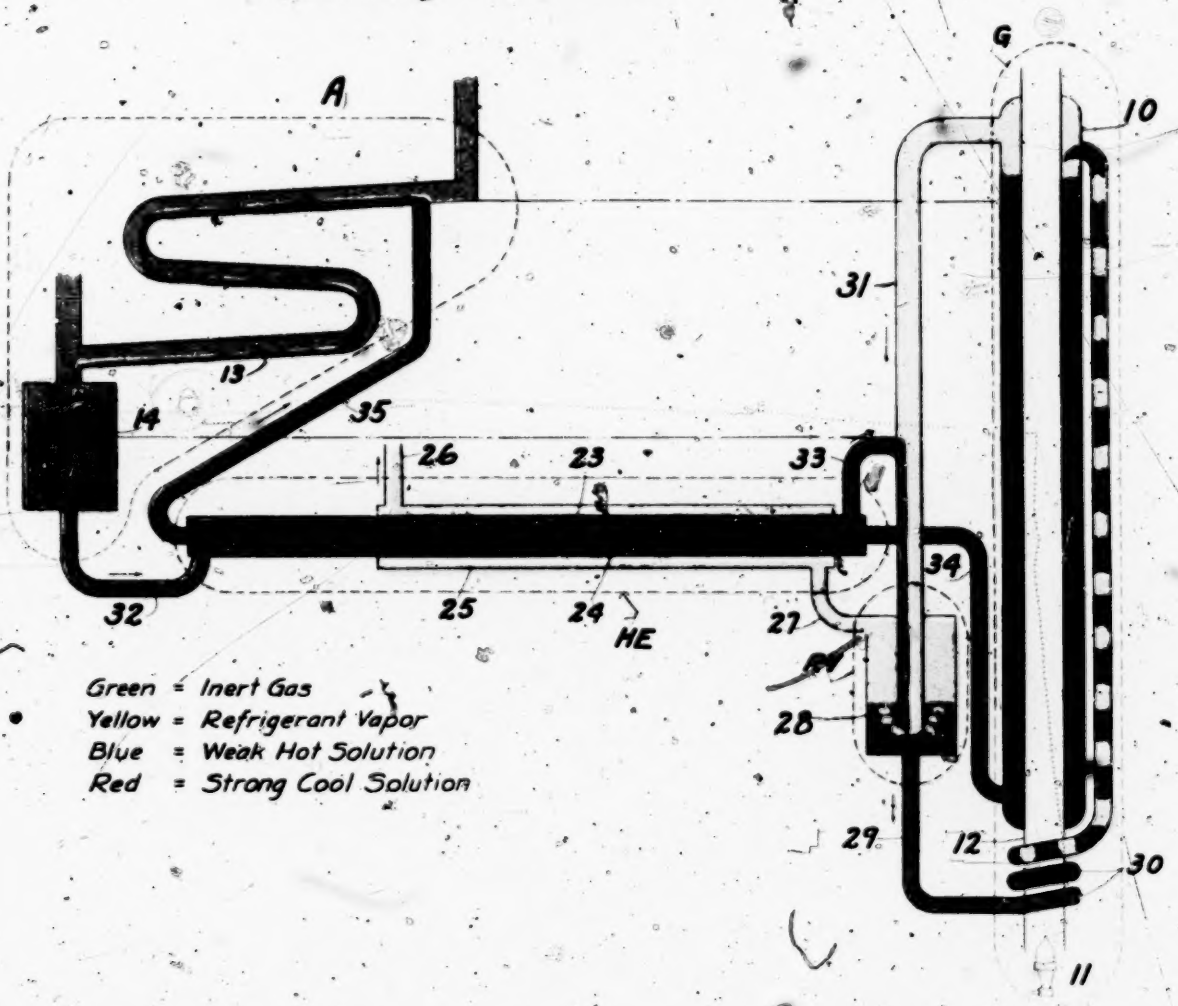


Green - Inert Gas
Yellow - Refrigerant Vapor
Blue - Weak Hot Solution
Red - Strong Cool Solution

Bergholm 2,201,362

Operating Condition

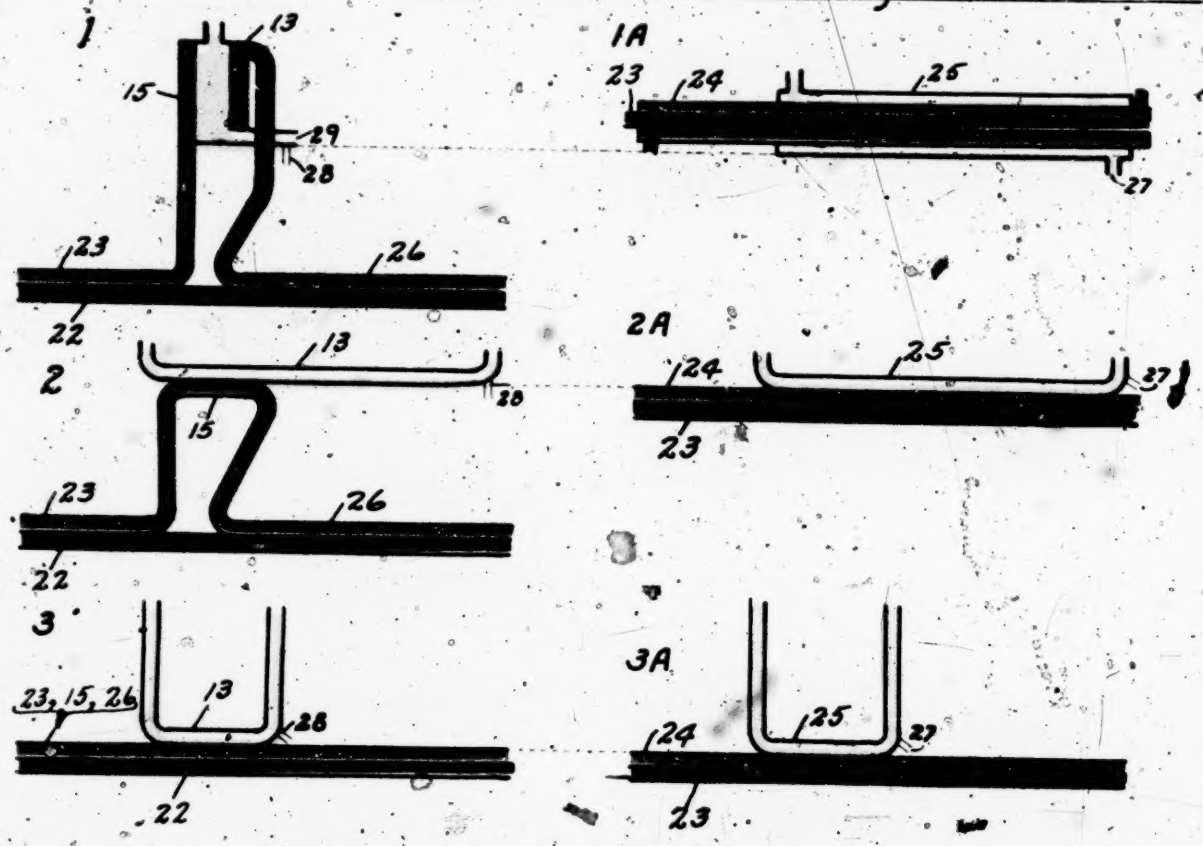
Pl's. Exh. No. 2



Heat Exchanger

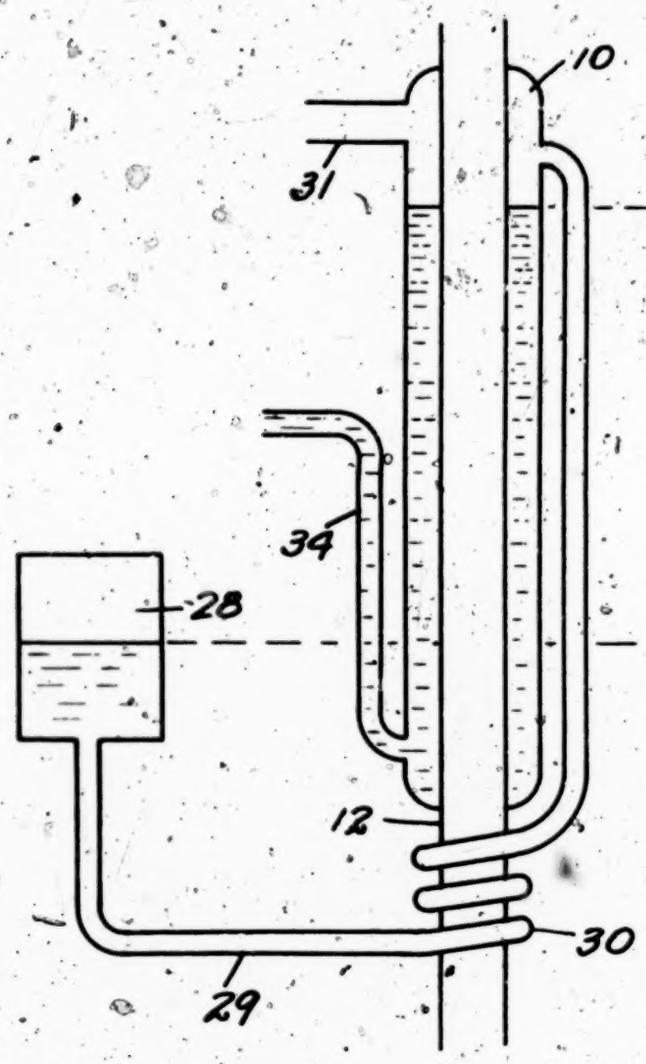
Coons. Bergholm.

Pl's. Exh. No. 3

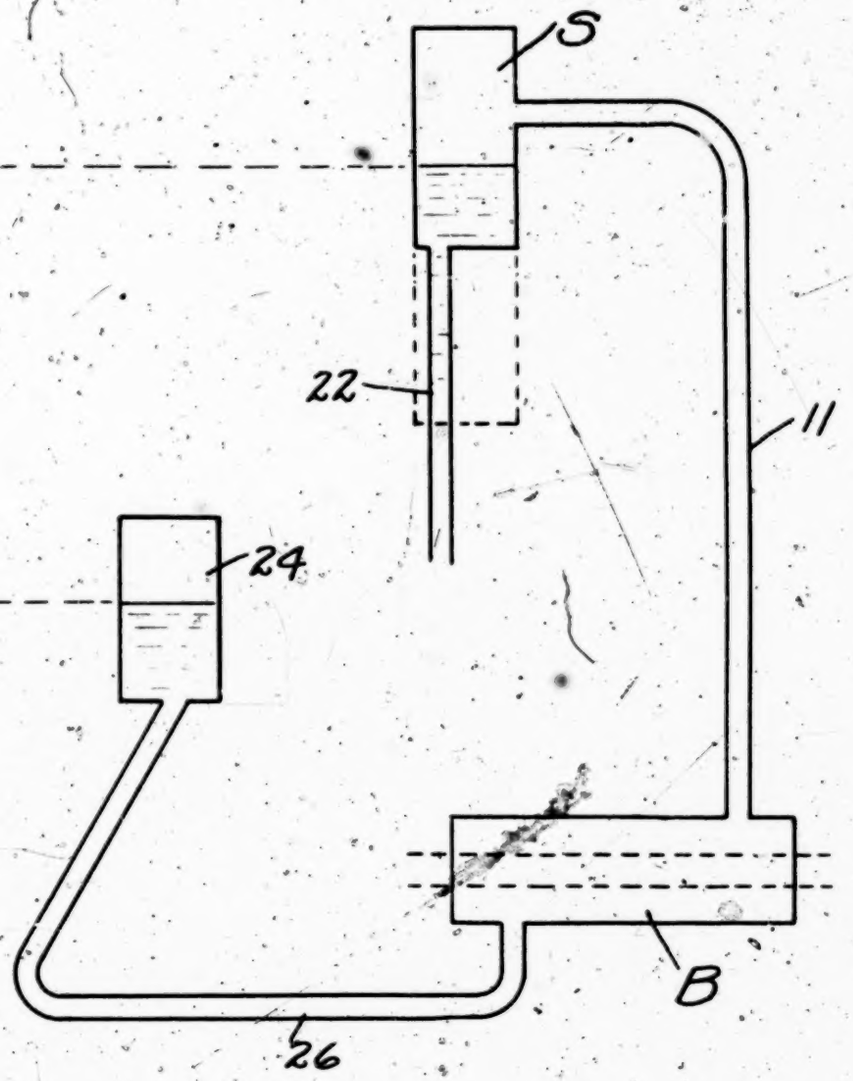


Pl's. Exh.-No. 4.

Bergholm's Generating Assembly.



Coon's Generating Assembly.



1 IN THE DISTRICT COURT OF THE UNITED STATES

FOR THE DISTRICT OF COLUMBIA.

The Hoover Company, North Canton, Ohio, *Plaintiff*,

v.

Conway P. Coe, Commissioner of Patents, Washington, D. C., *Defendant*.

Civil Action 15028.

Thursday, May 20, 1943, Washington, D. C.

The above-entitled cause came on for trial before Associate Justice Daniel W. O'Donoghue, in Civil Division No. 5, at 10 o'clock a.m.

Appearances:

On behalf of the Plaintiff:
W. D. Sellers, Esq.,
R. R. Fitzsimmons, Esq. and
W. S. Hodges, Esq.

On behalf of the Defendant:
R. F. Whitehead, Esq.

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2 **PROCEEDINGS.**

The Court: You may proceed.

Opening Statement on Behalf of the Plaintiff.

By Mr. Fitzsimmons:

Mr. Fitzsimmons: Your Honor, this is a civil action against the Commissioner of Patents under the provisions of Revised Statute 4915.

The application involved is an application by Curtis C. Coons, Serial No. 373,970 filed January 10, 1941.

The application is a re-issue application of the Coons patent 2,178,870 granted November 7, 1939, on an application filed August 8, 1936.

The Coons patent and application is assigned to The Hoover Company, the plaintiff in this action.

The Patent Office refused to allow Claims 15, 16, 38 and 39. No appeal has been taken to the Court of Customs and Patent Appeals. The sole ground of rejection was that the claims do not read upon the disclosure of the application and patent.

Claim 15 was copied from the patent to Bergholm 2,201,362, dated May 21, 1940, granted on an application filed November 20, 1937, and is Claim 7 of that patent.

Claims 16, 38 and 39 are based on Claim 7 of the Bergholm patent and all of the claims in issue were made for the purpose of interference with the Bergholm patent to determine the issue of priority.

We will show that there is no doubt that Claim 39 reads on the Coons disclosure.

We also believe and will show that Claim 15 when given its normal meaning also reads on the Coons disclosure.

If it is held that Claim 15 reads on the Coons disclosure there is no doubt as to the readability of Claims 16 and 38.

We will also show that a common invention exists in fact in the Coons application and in the Bergholm patent and that an interference should be declared between them.

We are asking this court to hold that Claims 15, 16, 38 and 39, or any of them, are in fact, readable on the Coons disclosure.

Now, if the Court please, I would like to refer to this drawing to explain briefly the principles of the invention.

The common invention here relates to absorption refrigerating systems, commonly known as the gas-fired refrigerator. In such systems heat is applied in boiler B to a strong solution of ammonia in water. This drives off the ammonia vapor which mingles with the solution to raise the weakened solution up into a gas separation chamber where the vapor separates from the liquid.

In such systems some water vapor also is driven off, and if this water vapor should reach the condenser and be condensed and flow to the evaporator, it will interfere with the operation of the system.

In prior machines it was the usual practice to run this conduit 12 directly up to the condenser with fins on it so that the water vapor, which condenses at a higher temperature than the ammonia, would flow backward through the tube into the fluid circuit.

Now, in such machines this the weakened solution flows by gravity through a conduit over to the absorber where this solution meets the refrigerant vapor generated in the evaporator and absorbs that vapor. The strong solution then flows backward directly to the boiler in heat exchange relation with the weak solution going to the absorber.

The purpose of that is that the strongest solution coming back from the absorber should be as hot as possible, and the weak solution going to the absorber should be as cold as possible, so that it can more readily absorb the refrigerant vapor. This is done by exchanging heat between these two liquids, the one flowing to the absorber, and the other flowing to the boiler.

In the prior machines, it was the usual practice to air cool the pipes leaving the gas separation chamber. The specific heat of that gas and the heat of condensation of the water vapor was totally lost in so far as refrigeration is concerned.

Now, both Coons and Bergholm conceived the idea of partially cooling this vapor by the cold solution flowing backward into the generator so that this cold solution would cool this vapor and condense the water vapor. That keeps the heat, both the specific heat of the vapor, and the heat of the condensation of the water in the system and farther heats the strong solution as it flows back to the boiler.

Both Coons and Bergholm lowered what is called the rectifier where they cooled the vapor, downward to a position so that the water vapor condensate could flow by

gravity down into the solution circuit so as to return to the solution circuit and not be trapped in a part of the system where it is of no value.

In order to prevent the ammonia vapor from being cooled to too great an extent the cool solution flowing backward to the rectifier is partially heated by heat exchange with the hot strong solution, so that it isn't too cold, but just the right temperature to condensate the water vapor. That is present in both the Coons and Bergholm.

We will show that Coons and Bergholm produced
6 ideatical results with substantially the same structure.

We will show that the only liquid level of any functional importance existing in the generator or generator vapor lift assembly, as disclosed in the Coons application and patent, is the level in the gas separation chamber and any other liquid level which may exist at times is merely incidental and of no functional significance. The Patent Office Tribunals held that Claim 39 did not read on the Coons disclosure on the sole ground that that disclosure disclosed two liquid levels in the generator and therefore, the claim was meaningless as applied to Coons.

We will show that Coons has a generator in the same sense as Bergholm.

We will also show that Coons has a triple heat exchanger in the same sense that Bergholm has.

We will also show that this heat exchanger of Coons brings vapors and liquids from the generator and liquid flowing to the generator into heat exchange relationship out of physical contact with each other.

We will also show that the heat exchanger of Coons is below the liquid levels in both the absorber and the generator.

We will also show that Coons creates a third surface level of liquid in the solution circuit below the exchanger to permit drainage of condensate from the vapor portion of the exchanger into the liquid circuit in exactly
7 the same sense as Bergholm.

That is all, your Honor.

8 **Opening Statement on Behalf of the Defendant.**

By Mr. Whitehead:

Mr. Whitehead: I have a folder, if the Court please, which I will later introduce in evidence which contains the following:

(a)—Bergholm patent.
(b)—Prints of drawing;
(c)—Examiner's Statement;
(d)—Supplemental examiner's statement.
(e)—Decision of the Board of Appeals;
(f)—Decision of the Board of Appeals on Petition for Reconsideration.

I would like to say just one thing, your Honor. These claims are copied from this Bergholm Patent for the purpose of interference with the Bergholm Patent.

I wish to call your Honor's attention to the decisions of the Court of Appeals of the District of Columbia and the Court of Customs and Patent Appeals which show that the doctrine of equivalents is not applicable in cases where claims are copied from a patent and that the claims must be literally readable upon the applicant's disclosure.

The Court: I don't quite get your point there, Mr. Whitehead.

Mr. Whitehead: What I mean is this: Sometimes a machine will do a thing in a certain way which is different from another machine. Now that doctrine does not
9 apply to this case.

That is all I wish to say at this time.

10 **Evidence on Behalf of the Plaintiff.**

Mr. Sellers: Your Honor, we would like to call as our first witness Dr. Coons.

Thereupon

Charles Curtis Coons, called as a witness for and on behalf of the Plaintiff, having been first duly sworn, testified as follows:

The Clerk: State your full name.

The Witness: Charles Curtis Coons.

Mr. Sellers: At this time, your Honor, I should like to offer into evidence, Plaintiff's Exhibit No. 7, a stipulation between counsel for the respective parties as follows:

(1) That photostatic copies, blue prints and carbon copies can be received in evidence with full force and effect of the originals subject, however, to verification and correction should error be found therein.

(2) That the printed copies of United States and foreign patents may be used and received in evidence with full force and effect of certified copies.

The Court: It may be received.

(Plaintiff's Exhibit No. 7 received in evidence.)

Mr. Sellers: And I also offer in evidence as Plaintiff's Exhibit No. 8 a stipulated condensation of the file wrapper and contents of the application of Coons which is here at bar.

11 The Court: It may be received.

(Plaintiff's Exhibit No. 8 received in evidence.)

Direct Examination

By Mr. Sellers:

Q. 1. Mr. Coons, will you please state your name, address and occupation?

A. My name is Charles Curtis Coons.

I live at North Canton, Ohio. I am in charge of the refrigeration and air conditioning laboratory of The Hoover Company, also located in North Canton, Ohio.

Q. 2. What is your educational background, Dr. Coons?

A. I received all of my university training at the University of Illinois, specializing in mechanical engineering and physical chemistry. In 1928 I received my Ph.D. in Physical Chemistry.

Q. 3. And what is your experience, please?

A. After leaving the university I was employed by the Leeds & Northrup Company for about four years, in electro-chemistry, and in 1933 I was employed by The Hoover Company, in the refrigeration laboratory.

In 1936 I was made head of that laboratory and have remained as such ever since.

Q. 4. Dr. Coons, will you please address the court?

A. Yes.

Q. 5. And your present title, Dr. Coons.

12 A. At present, I am in full charge of this laboratory, having complete direction of the research work.

Q. 6. For the benefit of the court, will you please describe briefly the compression refrigerator as we ordinarily know it and an absorption refrigerator system of the type of the Coons' invention here before the Court, with special reference to Exhibit 11 which is now placed upon the easel?

A. May I go over to the board?

Q. 7. Yes, if you wish to stand there and point to it, you may.

A. In the ordinary compression refrigerator, a motor and pump compress a refrigerant gas—the motor and pump are the element 30—and the compressed gas flows into a condenser—6, which converts that refrigerant gas into a liquid. The liquid flows through an expansion valve into an evaporator, 3, which, in this case is a coil structure.

Since the pump draws a partial vacuum on the evaporator the refrigerant liquid boils and absorbs heat from the surroundings in the ordinary sense produces refrigeration. That cycle is continued as long as refrigeration is desired.

Q. 8. Will you please describe for the Court, with special reference to Plaintiff's Exhibit 1, the absorption refrigeration, of which the Coons Patent 2,178,870 and the application here at bar are examples?

13 A. Along about 1921 a refrigerator, different from the existing compressor type was developed for commercial use.

This refrigerator is operated entirely by heat. That is, by the mere application of heat to the boiler B, refrigeration is produced in the evaporator marked E.

This small diagram up here is merely diagrammatic and should be increased in size to correspond to the vessels below.

The heat which is applied to the boiler B drives ammonia from a strong absorption solution which is nothing more than ammonia dissolved in water. The ammonia vapor intermingles with slugs of liquid just as in the ordinary coffee percolator, and raises the mixture into the vessel S where the vapor separates from the liquid. This vapor flows into the condenser C wherein it is liquified and then into the evaporator E where it evaporates to produce refrigeration just as in the compression refrigerator.

Now, to get the ammonia vapor back into the absorption solution a vessel marked A called the absorber is utilized. The ammonia vapor flows into the vessel A and is absorbed into the weak solution which has been generated in the Boiler B by the application of heat.

The absorption of the ammonia vapor in the weak solution, of course, increases the strength of the weak solution and makes it a strong solution and it is that strong solution which flows into the Boiler B and is heated.

That is a simple explanation of the operation of the ordinary ammonia 3 fluid absorption refrigerator.

Q. 9. How would you characterize the chief difference between the absorption refrigerator, and the compression refrigerator which you first described?

A. Well, in the compression refrigerator the pressure throughout the system is variable. That is, on the high side of the compressor the gas is under many pounds compression while on the low side the pressure is, of course, much less. It may be even less than atmospheric pressure. In this machine, which is operated by heat, the pressure throughout the entire system is substantially equal. That is, there is no substantial difference in pressure.

Q. 10. And a further distinction, possibly, relative to the presence of moving parts, what could you say in that connection?

A. Yes. In fact, the two are so decidedly opposite that you could name any number of differences.

In the compression machine, as I have just stated, the motor and pump, of course, operate. The pump is either a piston or a vane type which continuously operates to compress gas. In the heat-operated absorption machine

there is no moving mechanical part necessary to produce the refrigeration.

Q. 11. Referring now, particularly to Plaintiff's exhibit No. 1 which comprises a reproduction of figure 1 of the Coons Patent application, with certain parts colored and other parts reduced in size, will you please point out what problem is solved in the invention of Coons?

A. In the old style heat operated absorption machine the ammonia vapor is led directly from the vessel S into the condenser.

Now, since water is used as the absorbent, it is unavoidable when heating the strong solution, not to have the ammonia vapor contaminated with water vapor. If that water vapor is not removed, it will condensate along with the ammonia and form essentially a strong ammonia water solution, which has a deleterious effect on the operation of the machine.

In other words, you would not be able to produce as much refrigeration with water in the ammonia as you could produce refrigeration without the water.

So, in the old style machine the tube connecting vessel S with the condenser C was finned to permit air-cooling of that pipe and by the air-cooling of the pipe the water was condensed out of the ammonia water vapor mixture and flowed back into the vessel S.

Now, since this pipe was air cooled, all the heat which comes from the latent heat of the water plus the specific heat of the gas, you have to cool the gas from some high temperature down to the condensing temperature, that specific heat plus the heat of evaporation of water was lost to the air, and that meant that more heat had to be put into the boiler to produce a given refrigerating effect or capacity.

Now, if that heat could be saved, that would mean a more efficient refrigerator, so this device included in the dotted line marked HE was used to save that heat, and that is done by bringing the hot ammonia water vapor mixture from the vessel S into heat exchange with the cold strong solution, which is slightly pre-heated, flowing from

the absorber to the generator, the heat exchange taking place between the pipes 13 and 15.

In other words, the specific heat and the latent heat of the mixture is transferred into the strong solution which flows into the boiler or vessel B, and thus permits the reduction in the heat which normally is applied to the vessel B for the production of that particular refrigerating effect.

Q. 12. In the old units, did I understand you to say that the heat of the refrigerant gas flowing from the separating chamber to the condenser was lost to the air?

A. That is right.

Q. 13. And do I understand you to say that in the present invention the heat of condensation of the water vapor plus the specific heat of the gas is usefully employed to heat the strong liquid which is returning to the boiler B?

A. That is correct.

17 Q. 14. Is that problem, and is that solution of the problem, common to both your invention and your application here at bar and to the Bergholm Patent, to which certain claims relate?

A. Yes, it is.

Q. 15. The identical problem is present in both cases?

A. Yes, exactly the same.

Q. 16. And the solution of the problem?

A. It was accomplished in exactly the same way.

Q. 17. You may resume the stand, Doctor.

Have you built an operating model?

A. Yes, we constructed the invention into one of the machines we had at The Hoover Company.

Q. 18. And did it operate satisfactorily?

A. Yes, it did.

Mr. Sellers: Your Honor, we have, in one of the rooms in this building, an operating model of the Coons invention, which is, as I understand, in working condition and operating, and we would appreciate very much if your Honor would view that machine.

The Court: Very well.

Mr. Sellers: You have no objection, have you, Mr. Whitehead?

Mr. Whitehead: No. Glad to have the court see it.

(Whereupon, Court and counsel retired from the
18 Court room to view the model, at which time and place the trial was resumed as follows:)

Mr. Sellers: Dr. Coons, will you please explain your working model to his Honor, which is identified as Plaintiff's Exhibit No. 5, with specific reference to the diagram which you have in your hand, and which is a small size reproduction of Plaintiff's Exhibit No. 1?

The Witness: Your Honor, this contraption to the right of the machine is merely an auxiliary cooling unit which we had to make because there isn't any cold water in the room.

Normally, these machines are now air-cooled and require no gadgets like that, but this was an old machine that we revised to include the invention and it was water-cooled and I did not hear until a late date, that we did not have water, so we built that. All it does is circulate water through the system to cool the water and the condenser. It has nothing to do with the operation of the machine other than that.

Now this, in general, comprises the normal old-style absorption refrigerator with the invention itself, which is this device enclosed within the dotted circle marked HE here. The boiler is the vessel B which is there (indicating); and the gas separating chamber is a vessel in here (indicating) to which the pump is connected.

19 That is the line 11—or pipe 11.

The hot ammonia vapor flows downward into the pipe 13, which is enclosed in this insulation. The strong ammonia liquid from the absorber flows down through pipe 23 and is partially cooled prior to its passage through the pipe 15. The heat of condensation of the water as well as the specific heat of the gas is transferred into that strong liquid which then flows into the reservoir marked RV on that chart, and from the reservoir the strong liquid then flows back into the generator.

The water which is condensed in the pipe 13 flows downward through the pipe 28 also into the reservoir marked RV. Now, the reservoir is this large vessel to the right of the pipes 13 and 15, and the complete unit, of course,

must be insulated, otherwise the system would operate very poorly.

It is essential in all of these absorption machines to insulate the parts which are heated and from which heat must not be discharged to the air. The ammonia which is purified from the water in the pipe 13 flows upward through the pipe—it is the pipe connected with the top of pipe 13—into the coil condenser, where it is liquefied, and the liquid flows down through this exhaust tube and upward into the evaporator, and that liquid evaporates and produces refrigeration, and the gas which comes from the evaporation flows to the absorber, where it contacts the weak
20 solution flowing from the vessel S, down through pipe 22, and upward into the top of the absorber, and by that contact of the ammonia gas with the weak liquid, the strong liquor is formed, merely by solution, and the strong liquor, as I have explained, flows back through the heat exchanger, which consists of pipes 23, 15, 13, 26 and 22.

By Mr. Sellers:

Q. 19. You might identify the weak and strong liquors by colors, if you will, Doctor?

A. Yes. The strong liquor is colored red. The weak liquor is colored blue. The ammonia vapor is colored yellow.

Q. 20. Will you please point out to the Court, Dr. Coons, the lev of the liquid level in the boiler which is identified as B.

A. The gauge glass which we have here is connected to the top and bottom of the Boiler B, and you will note that the top of the boiler can be seen here and is merely a horizontal tube through which a heating tube is formed as shown on the sketch right here.

The vapor pump is this tube connected to the top of the boiler.

Now, the gauge, as I stated, is connected by pipe to the top of the boiler tube and also to the bottom of the boiler tube, and you can see that the gauge glass is com-
21 pletely filled with liquid.

Q. 21. What is that liquid? What color is it?

A. It is yellow because it has chromate dissolved in it to prevent corrosion within the system, and that is a common means of preventing corrosion in these machines.

Q. 22. Is that gauge filled with liquid up to the top of the boiler level?

A. Yes.

Q. 23. Why is it we cannot see the connections of the gauge to the boiler in a clear manner?

A. We insulated it to get better operation. You can see the bottom tube which runs upward to the bottom of the boiler tube.

The top of the gauge is not connected exactly to the top of the boiler but runs up to the top of the system. In other words, all that it is necessary to do in these gauges is to connect the gauge from the bottom of the point where you want to take the level to some upper point and that does not make any difference as far as the level is concerned in the gauge.

Q. 24. In other words, if there is a liquid level in the boiler, you have a U-tube?

A. The gauge forms the line of the U-tube.

Q. 25. And the water takes the common level in the U-tube?

22 A. Yes.

Q. 26. And, as an expert you state that the liquid level in the gauge accurately indicates the liquid level in the boiler?

A. If there were a liquid level in the boiler, but the gauge is completely filled, and there is no level in the boiler, the boiler is completely filled with liquid.

Q. 27. Now, turning to the gas separating chamber, which is a part of the generator indicated by the dotted line and colorings showing the separating chamber system, will you please refer to the gauge which shows the liquid level in the separating chamber?

A. Again the gauge is connected to some point lower than the vessel S, about in there (indicating) and the upper part of the gauge is connected to an upper part of the system, some gas part, so that the gauge again forms a

part of the U-tube, and as all liquid that stands in a U-tube will seek its own level, they are both indications of the U-tube, and the level is seen here at the upper part of the gauge and stands higher, somewhere up here (indicating) in the vessel S.

It fluctuates because the gas bubbles up from the boiler,—a boiling action just as a coffee percolator. The level fluctuates in that vessel S.

Q. 28. What is the liquid level in the generating system?

23 A. The only liquid level in the generating system, which comprises the boiler B and the pipe I1 and the vessel S is the level which is shown in the gauge connected to the vessel S.

There is no other liquid level in that generating system.

Q. 29. Now I see another gauge at the left of the exhibit? Will you please tell the Court what that discloses?

A. The gauge to the left of the exhibit is connected to the bottom of the absorber A and to a point higher than the absorber. No, it is connected to the gas pipe leading into the bottom of the absorber to show the liquid level in the absorber, and again the lower part of the gauge is connected so as to form a U-tube, and the gauge is, in this case, the left part of the U-tube, and the level of liquid in the absorber, of course, is shown on the gauge which is shown near the bottom of the absorber. You can see the yellow absorption liquid.

Q. 30. The little pipe right in the center?

A. It is a glass pipe.

Q. 31. And where does that pipe lead, to the bottom of the absorber?

A. It is right at the bottom, I judge about a half an inch above the bottom of the cylindrical absorber.

Q. 32. So that the gauge shows you do have a liquid level in this absorber?

24 A. That is right.

Q. 33. Now, referring to the evaporator, will you please describe its character to the Court as there illustrated?

A. The evaporator, which is to the rear of the unit, is a cylindrical vessel. It looks exactly like the evaporator

shown in the patent 2,178,870 figure 1. The evaporator is the vessel EE, which is a cylindrical vertical tube with heads welded at the top and the bottom. The internal structure of the evaporator is a series of horizontal baffle plates with holes through the center.

Q. 34. You don't need to go into that in detail. It is not essential here.

A. I guess that concludes with the evaporator then.

Q. 35. Do you have a reading upon the thermometer, Doctor, on this evaporator?

A. Yes, which is—there is a thermometer which is in heat exchange with the outer wall of the evaporator and it now reads one degree above zero.

That is just one degree Fahrenheit.

Q. 36. How does that compare with the ordinary operating temperature of your usual household refrigerator?

A. The temperature at the bottom of the ordinary household refrigerator usually runs about 20° Fahrenheit.

Q. 37. So that the temperature you have there is 19° colder than in the ordinary refrigerator?

A. That is correct.

Q. 38. Referring to the gauge at the rear of the machine, Doctor, please describe to the court what that shows?

A. The gauge to which you refer is connected to show the level in the reservoir marked RV, and again the gauge is connected to the bottom part and to some part of the gas system above the reservoir and the gauge forms a part of the U-tube with the reservoir.

In other words, the gauge comes up like that (indicating) to the right.

Q. 39. And what does that gauge show?

A. That gauge shows the level of the solution in the reservoir. The level is about in the center. If you hold a match there you can see it, your Honor.

The Court: I will take your word for it.

The Witness: The level is about at the center of the reservoir.

It is a yellow solution but it is rather difficult to see.

By Mr. Sellers:

Q. 40. Does this comprise an operating unit, Doctor?

A. It does.

Mr. Sellers: Do you care to ask any questions, Mr. Whitehead?

Mr. Whitehead: Just one question.

Cross-examiation.

By Mr. Whitehead:

26 X-Q. 1. Did I understand you to say that the boiler is always full of water and there never can be said to be any level of water in it?

A. That is exactly right.

X-Q. 2. Is that true actually?

A. In all machines of this type there is no level in the boiler.

X-Q. 3. Take the machine as described in the patent you have in your hand. Is there anything in that description to show that fact, to show that that is so constructed that there would be no level in the boiler?

Mr. Sellers: I object to that question. The patent speaks for itself and you know there is a statement in there to that effect.

The Court: Objection overruled.

He may answer.

The Witness: Well, I have been working with machines of this type for ten years and, regardless of what the patent says, I state that there is no liquid level in the boiler. It is just like a coffee percolator. When heat is applied to the boiler ammonia is driven out of the strong solution and a mixture of vapor and slugs form a column enclosed in the pipe H1 and, as a result of the decrease in total
27 density by this intermingling of vapor and liquid, the force of the liquid maintained in the reservoir RV will force that mixture upward into the vessel S.

Mr. Whitehead: That is all.

Mr. Sellers: That is all, your Honor. We can adjourn to the courtroom.

(Whereupon the following proceedings were had in the courtroom:)

Mr. Sellers: I wish to thank your Honor for stepping down to view the exhibit.

Redirect examination.

By Mr. Sellers:

R-D. Q. 1. Mr. Coons, Mr. Whitehead mentioned whether or not patent 2,178,879, of which the present application is a reissue, did not contain in its description some reference to a level in the boiler and for the Court's benefit I should like to point out to you the part of the specification to which I think Mr. Whitehead refers. I ask you to read, on page 3 of the specification, Column 2, beginning at line 53.

A. Starting at line 53, I read:

"From the above description it will be clear that we have different types of rectifiers adapted to be
28 cooled by strong aqua in accordance with the present invention has been illustrated and described. In all of these arrangements, the rectifier is shown situated above the normal solution level in the boiler so that the rectifier can be drained by gravity flow into the boiler."

R-D. Q. 2. I also ask you to read from page 2, Column 1, beginning at line 61.

A. Starting at line 61 I read:

"It will be apparent from the above description that in the arrangement illustrated in Figure 1, the rectifier is located below the bottom of the absorber but above the normal level of the solution in the boiler B and in the reservoir 24."

R-D. Q. 3. That is enough. Thank you.

Is there actually a liquid level in the boiler B of your construction?

A. No there is not.

R-D. Q. 4. Is that boiler B actually full of liquid?

A. It is.

R-D. Q. 5. Were there a liquid level there, would it have any functional significance in the operation of your unit?

A. No, it would not, because there can't be a liquid level there and still have the machine operate.

R-D. Q. 6. What is the level in the generating unit, of which the boiler is a part, which is significant?

A. It is the level shown in the vessel S marked in blue. That is the level in the generating system enclosed in the dotted line G which is of prime importance to the operation of the refrigerator.

R-D. Q. 7. Why is this level important; why is the level in the vessel S important?

A. That level must be above the top of the pipe 22 which joins the absorber A so that the absorption solution can flow by gravity down through pipe 22 and upward into the absorber A.

R-D. Q. 8. Now, were there a level in the boiler B, could the liquid flow from the boiler B in that level through the pipe 22 up into the absorber A as you describe?

A. Not in that construction. It would be impossible.

R-D. Q. 9. So that even though there were a liquid level down here would you say that it had any significance whatsoever?

A. It could not have any.

R-D. Q. 10. Actually is it not a fact that the wording used is a misleading choice of words by the attorney who prepared the case?

A. Yes, it is. I have read over that patent, since it belongs to me, and there are other structures shown in the patent which, if it is studied, it can be seen how that particular wording was confused with this particular figure.

R-D. Q. 11. Will you please place upon the easel, Plaintiff's Exhibit No. 2, which comprises a colored showing of the relevant parts of the figure 1 of the Bergholm patent 2,201,362 from which certain of the claims here at bar are derived, and will you please describe that construction for the benefit of the Court.

A. In Exhibit No. 2 we have the same structure as in Exhibit No. 1 except that the tubes which form the structure have a slightly different configuration. The operation of the structure both in Exhibit No. 1 and Exhibit No. 2 are identical.

In Exhibit No. 2 the boiler is the pipe 30 coiled around a heating tube. The gas flame 11 can be seen just below the boiler and is for the purpose of heating the boiler. The heat causes the ammonia to be driven from the strong solution and again a mixture of vapor and liquid results and the intermingled slugs of liquid and vapor rise through the tube connecting the boiler 30 with the vessel 10.

In the vessel 10 the liquid and vapor separate by gravity. The weak solution, which is colored in blue, then flows downward through the vessel 10 upward through pipe 34 and 35, into the absorber A, which is enclosed in part—I beg your pardon, that absorber is 13—which is enclosed in part within the dotted line A.

In this case the absorber 13 is a tube and is inclined downward continuously so that the liquid can flow by gravity into the reservoir 14.

Now, in the absorber 13 the weak solution intermingles with the ammonia vapor and absorbs it, forming the strong solution which is shown in red color, and that strong solution flows from the vessel 14, which is called the reservoir, through pipe 32, 24 and 33, downward into the vessel marked RV and from that vessel it flows downward through pipe 29 into the boiler 30.

The ammonia vapor, which has separated in the top part of the vessel 10, goes downward through pipe 31, through the vessel RV, through the pipe 25 and 26, and from there it goes into a condenser, which is not shown on this exhibit 2.

Again your Honor will note that the strong liquid, which is marked in red, and flowing through the pipe 24, is brought into heat exchange with the hot ammonia vapors flowing from the vessel 10, and by means of that heat transfer the specific heat of the ammonia vapor, plus the latent heat of condensation of the water, are transferred into the strong liquor and heats it before it enters the boiler, thereby saving heat.

The water which is condensed from the ammonia water vapor mixture flows by gravity through pipe 27 into the vessel RV and mixed with the strong solution which is flowing to the boiler 30.

You will also note that prior to the heat exchange of the strong aqua solution and hot vapors, the strong solution is pre-heated by the hot, weak solution flowing through the center pipe 23.

The reason, of course, for pre-heating the strong solution is to avoid the condensation of ammonia in the pipe 25.

R-D. Q. 12. Is the boiler 30 of Bergholm the functional equivalent of the boiler B of Coons?

A. Yes, it is.

R-D. Q. 13. Is there any liquid level in the boiler B of Bergholm?

A. No more liquid level there than there is in Exhibit 1.

R-D. Q. 14. Does the container 10, which has a liquid level near its top in Bergholm correspond to the vessel S, which has a liquid level in Coons?

A. It does.

R-D. Q. 15. Does the heat exchanger contained within the dotted lines and marked HE in Bergholm correspond to heat exchanger which is enclosed in dotted lines
33 and marked HE in Coons?

A. It is the functional equivalent.

R-D. Q. 16. And is there a pre-heating of the strong solution coming back from the absorber to contact with the gas in Coons just as there is a pre-heating in Bergholm?

A. Yes.

R-D. Q. 17. And is the reason for that pre-heating identical in each case?

A. It is.

R-D. Q. 18. What is the generating assembly in an absorption refrigerator? Briefly, what are the units?

A. The generating system is the assembly consisting of the boiler B, pipe 11, and vessel S shown in Exhibit 1 enclosed within the dotted line marked G.

R-D. Q. 19. Referring now to Exhibit 2, do we find a generating unit comprising the same parts?

A. Yes, it is identical.

It contains the boiler 30 and the vessel 10, which is equivalent S in exhibit 1, and a connecting pipe, all enclosed within the dotted line marked G also in exhibit 2.

R-D. Q. 20. Are the two generating units of the Bergholm and Coons devices functionally identical?

A. They are absolutely identical.

R-D. Q. 21. I have placed upon the easel Plain-
34 tiff's Exhibit No. 4 which comprises a diagrammatic showing of the two generating assemblies of the Coons and the Bergholm constructions.

Will you point out for the benefit of the court, the identity of those constructions?

A. In Exhibit No. 4 the Bergholm structure is shown to the left and the Coons structure to the right.

In each structure there is a reservoir, 28 in Bergholm and 24 in Coons. In each reservoir there is maintained a solution level. Each diagram contains a boiler. In Bergholm it is a pipe coiled around a heating tube. In Coons the boiler is a concentric horizontal tube with an internal tube for heating the liquid. Each boiler is connected to a gas separating chamber by a pipe. The pipe in Bergholm is shown as being connected between the boiler 30 and the top of the vessel marked 10.

In Coons the pipe is marked No. 11. Each diagram shows a gas separating chamber for the purpose of separating the hot ammonia vapors from the weak liquid.

In Bergholm it is marked 10 and in Coons it is marked S.

R-D. Q. 22. Doctor, are the vessels 28 and 24 of Bergholm and Coons respectively actually a part of the generating assembly?

A. They are not generally considered a part of
35 the generating assembly; no, sir.

R-D. Q. 23. What is the function of the liquid level in those two vessels?

A. In order that liquid be pumped from the level in 28 to some upward level, a level above that in 28 which is shown in the vessel 10 of Bergholm and vessel S of Coons, it is necessary to use the old coffee percolator principle in which a head of liquid is maintained on a heated element which is below the head of liquid maintained on that heated element, and by heating a portion or all of the liquid say in boiler 30 Bergholm, or boiler B in Coons, part of the liquid is changed to gas,—in this case it would be ammonia,

—which is driven from the solution the ammonia gas, intermingles with the liquid, and forms a column of bubbles and liquid in the pipe 11 of Coons and the pipe which joins boiler B to the vessel 10 of Bergholm; and the reason that that mixture of vapor and liquid rises is because the average density of that column is less than the average density of the liquid column maintained on the boiler as a result of the level in the reservoirs 28 and 24 of Bergholm and Coons respectively.

R-D. Q. 24. As a matter of fact, Doctor, the weight of the liquid in Bergholm between the level in vessel 28 and the bottom of pipe 29 must be greater than the total weight of liquid in the boiler 30 plus that in the rising pipe into the vessel 10, in order that the weight of liquid in the
36 vessel 28 will force the liquid in the boiler 30 and the pipe into the vessel 10?

A. Yes, that is correct.

R-D. Q. 25. And isn't the function the same, of this level in this boiler and this pipe, isn't that identical in the two structures?

A. That is right. It is like the old mine pump in which compressed air is forced into a pipe containing water and a series of bubbles have formed, but due to the fact that there is a level of water above the point where the air enters the column of water that liquid head will force the mixture of air and water upward to some higher level.

R-D. Q. 26. As a matter of fact, you have solid liquid in your boiler in each case and liquid and gas above that in each case?

A. That is correct.

R-D. Q. 27. Is it important where the solid liquid leaves off and the gas and liquid begins as long as the total weight is less than the counterbalancing weight on the other side of the U?

A. That is correct.

The exact line where the bubbles begin is intangible. For example, in heating the boiler 30 undoubtedly there are no bubbles in the bottom of the pipe coil but as the coils
37 rise upward, at some point within that boiler line bubbles begin to form and at the top part, we have

a mixture of bubbles and liquid and an upward rising column of vapor and liquid.

Mr. Sellers: Thank you, Doctor. Please resume the stand.

I hand the court a copy of the patent Hahnel 1,877,857 which has been marked as Plaintiff's Exhibit No. 9.

By Mr. Sellers:

R-D. Q. 28. I ask the witness if he is familiar with this construction (indicating)?

A. Yes, I am familiar with this structure.

R-D. Q. 29. Describe it, please, to the Court, briefly.

A. In Figure 1 of Hahnel there is shown a boiler marked 1, a pipe marked 3 and a vessel marked 4, and an electric heating unit is shown as No. 2.

R-D. Q. 30. And what is the unit shown in Hahnel figure 1 known as?

A. That figure, comprising the vessels 1 and 4, with the pipe 3, is referred to as a generating assembly.

R-D. Q. 31. Is that the same generating assembly we have in Bergholm and in Coons, as illustrated in Exhibit 4, for example?

A. It is. It is exactly the same.

Mr. Sellers: I call the Court's attention to the
38 fact that the Hahnel patent bears the date September 20, 1932, and I direct attention that the descriptive matter of this patent bears out the contention that this is a well-known feature in refrigerators comprising a generating unit.

By Mr. Sellers:

R-D. Q. 32. Referring again to Plaintiff's Exhibit No. 1, which I have placed upon the easel, will you please identify the heat exchange means in Coons in detail?

A. The heat exchange means in exhibit No. 1 referred to is the assembly enclosed within the dotted line marked HE and comprises the tubes 23, 15, 13, 22, and 26.

23 and 26 are really the same tube.

Now, in operation the heat exchanger functions like this: The strong solution which flows from the absorber is quite cold and it first comes in contact with the weak solution, marked in blue, and flowing in the opposite direction

through pipe 22. The strong solution is flowing to the right in pipe 23.

In other words, as a result of the heat exchange the cold strong solution is slightly heated and this pre-heated strong solution then flows upward through pipe 23 and comes in contact in pipe 15 with pipe 13, which is being heated by the hot ammonia water vapor mixture, and as a result of that heat exchange the strong solution is still further heated, and then the strong solution over-
39 flows the pipe 15 and flows down through pipe 25 into the vessel marked 24, and from there it flows through pipe 26, again coming into heat exchange with the weak solution, marked in blue which is flowing to the left from the vessel S, and as a result of that heat exchange, the strong solution is heated still further just before it enters the boiler B.

R-D. Q. 33. Now, Doctor, you mentioned previously that in the gas from the speparating chamber S which passes through the tube 12 and into the vessel 13, there is a condensing problem present. What happens to the condensate in that gas?

A. As a result of the heat exchange in the tubes 13 and 15, the water in the gas is condensed into a liquid and it is important that that liquid be drained back into the solution circuit of the system.

Therefore, this part of the heat exchanger, which is the important part,—

R-D. Q. 34. (Interposing) Please identify that for the purpose of the record.

A. The part of the heat exchanger consisting of pipes 13 and 15, must be above the solution level which is maintained in the reservoir marked 24, so that the liquid water will drain by gravity back into the solution circuit.

R-D. Q. 35. Is the condensed liquid shown in blue
40 in the vessel 13 which you have just pointed to?

A. Yes, at the bottom of the pipe 13 may be seen the weak solution maintained at a level just high enough to overflow the pipe 12 and flow downward through pipe 28 into the vessel 24 where it mixes with the strong solution.

R-D. Q. 36. Thank you.

Will you please turn to Plaintiff's Exhibit 3.

I have placed upon the easel plaintiff's exhibit No. 3 which comprises a diagrammatic comparison of the heat exchangers on the Coons and Bergholm constructions and I ask you, Dr. Coons, for the benefit of the court, to explain this showing?

A. The exhibit No. 3 consists of figures 1, 2 and 3 and 1A, 2A and 3A.

Figures 1 and 1 A respectively are diagrams or drawings of the heat exchangers lifted bodily from the patents of Coons and Bergholm.

Again we see the heat exchange means betweeen the hot vapors and the strong solution, in Coons by the pipes 13 and 15 and in Bergholm by the pipes 25 and 24.

The strong solution in each drawing is shown being preheated by the weak solution, in Coons by pipes 23 and 22 and in Bergholm, by pipes 23 and 24.

And it is also important to note that in each case,
41 the bottom of the gas heat exchange portion of the drawings, in Coons it is pipe 13; and in Bergholm it is pipe 25, the bottom of those pipes must be above the dotted line shown joining these two pipes 13 and 25 in the Coons and Bergholm respectively, so that the liquid formed by condensation in these two pipes will drain by gravity from them down into the solution circuit again.

Now, to simplify the figures 1 and 1A of Coons and Bergholm respectively, the more complicated structure shown in figures 1 and 1A is replaced by the simplified structure shown in figures 2 and 2A.

In figure 2, showing the Coons structure, the heat exchanger between the hot vapors of pipe 13 and the strong solution in pipe 15 are shown as two simple pipes, and in Bergholm, figure 2A, the concentric tube structure is replaced by three simple tubes, and again the heat exchange between the hot vapors and the strong solution is shown by the pipes 25 and 24.

R-D. Q. 37. Is there any real difference between heat exchange by the concentric pipes and pipes which merely make plain contact?

A. No, there is absolutely no difference. It is merely a matter of the area of contact. The principle is exactly the same, regardless of how that contact is brought about, or in what configuration it is brought about.

Again in figures 2 and 2A may be seen the dotted
42 line joining the bottom of pipe 13 of Coons and the bottom of pipe 25 of Bergholm, so that the condensed water may flow by gravity from these pipes into the liquid circuit below.

Now, to go one step further, figures 2 and 2A were changed again to simplify them, and the change is shown in figures 3 and 3A.

It is entirely unimportant where the heat exchange means occurs, between pipes 23 and 22 or 26 and 22. That is, that level is unimportant.

And they may be raised upward to contact or to form three pipes in parallel as shown in figure 3.

R-D. Q. 38. To which structure are you referring, Doctor?

A. I am referring to the Coons structure of figure 3.

Again in figure 3 may be seen the heat exchange between the hot ammonia vapors in pipe 13 with the strong solution flowing in pipe 23 and pipe 15 and pipe 26, which is shown in red.

Below that the weak solution, shown flowing in 22 by the blue color is shown in heat exchange with the strong solution, marked in red.

Now, since the actual configuration of structures for heat exchange is unimportant; for the purpose of explanation we can merely shorten pipe 25 of Bergholm to make the smaller U-tube which is shown contacting the pipe 24
43 conveying the strong solution. The pipe 25, of course, contains the hot ammonia vapors.

Now, it is obvious that figures 3 and 3A are identical, and since 3 is the same as 1 in principle and 3A is the same as 1A in principle, then it follows that figure 1 and figure 1A are identical, which they are exactly in function.

R-D. Q. 39. Did I understand you to say, Doctor, that the only pipe level which is important so far as the heat exchange is concerned is the level of the pipe through which the refrigerant vapor passes?

A. Yes, the bottom part of that pipe.

R-D. Q. 40. And the strong and weak liquid solution pipes can be raised or lowered relative to that as shown without any effect upon the operation?

A. That is absolutely true. It makes no difference.

R-D. Q. 41. Please resume the stand.

As used in the refrigeration art, what is meant by a triple heat exchanger?

A. The refrigeration art refers to a triple heat exchanger as a device for bringing three fluids into heat exchange.

R-D. Q. 42. Are the identical fluids brought into heat exchange in Bergholm and Coons?

A. They are.

R-D. Q. 43. And in the same manner?

44 A. Exactly.

Mr. Sellers: I mark as plaintiff's Exhibit 12, copy of the Mortensen Patent, 1,854,619, which shows a triple heat exchanger, the patent being issued April 19, 1932.

By Mr. Sellers:

R-D. Q. 44. What is a heat exchanger, defined broadly, Dr. Coons.

A. Broadly, a heat exchanger is a device for bringing into heat exchange relationship fluids having different temperatures so that the heat from the hotter fluid can be transferred to the colder fluid.

R-D. Q. 45. Please refer to the Mortensen Patent, Plaintiff's Exhibit No. 12. Does this patent show the triple heat exchanger of the concentric type as shown in Bergholm?

A. Yes, it does.

Mr. Sellers: I mark as Plaintiff's Exhibit No. 6 a chart which shows the application of the four claims here at bar to the Bergholm and Coons construction, and pass that over.

By Mr. Sellers:

R-D. Q. 46. To your knowledge, Dr. Coons, does this chart accurately disclose the application of the four claims to the Bergholm and Coons constructions?

A. Yes, it does.

45 Mr. Sellers: Your Honor, would you like to have us apply these claims for your benefit? That is the issue. This is the issue, your Honor, whether or not the claims read upon these structures.

The Court: Produce whatever testimony you desire. I have no wish in the matter.

By Mr. Sellers:

R-D. Q. 47. Will you please apply, for the benefit of the Court, Dr. Coons Claim 15 to the Coons construction as illustrated in Exhibit No. 1?

A. I read Claim 15 and apply it to the Exhibit No. 1:

"An absorption refrigerating system, having a circuit for absorption liquid."

The circuit for absorption liquid comprises the absorber A, the pipe 22, the pipe 15, the pipe 25, the vessel 24, the pipe 26, the boiler B, the pipe 11, the vessel S, the pipe 22.

"Including a generator."

May I ask how I can distinguish the parts of this Claim?

R-D. Q. 48. Well, I would suggest you use the chart 6, Dr. Coons, which has it divided rather clearly.

A. Using the chart, Exhibit No. 6 now claim 15 will be applied to the Exhibit No. 1, starting at the beginning.

The Claim 15, of course, is shown in the column
46 of figures to the left on the exhibit 6, and the vessels or pipes in question are shown in the column upon the right of Exhibit No. 6.

The limitation is the part of the Claim read.

Now, starting in with Claim 15 under limitation, I read:

"An absorption refrigerating system having a circuit for absorption liquid including—"

No question about that.

"—a generator,—"

That is the vessel B, the pipe 11, and the vessel S.

"—an absorber."

The absorber is the vessel A.

"—and a triple heat exchanger—"

That is composed of the pipes 22, 26—22, 23-13, and 15.

"—said exchanger—"

That consists of the pipes whose numbers I just read.

"—being connected to conduct vapors * * * from the generator—"

That is the conduit 12.

"—(being connected to conduct) * * * and liquid from the generator—"

That is the conduit 22.

47 "(being connected to conduct) * * * and liquid flowing to the generator—"

That consists of conduits 23, 15, 25, vessel 24 and conduit 26.

"—in heat transfer relation out of physical contact with each other,—"

That occurs in pipes 22, 26-22, 23-13 and 15.

R-D. Q. 49. What do you mean by "out of physical contact with each other", Doctor?

A. That means that the two fluids do not come into physical contact. That is, they do not touch or intermingle.

R-D. Q. 50. Just the conduits touch?

A. That is right.

R-D. Q. 51. Continue, Doctor.

A. "—said exchanger—"

R-D. Q. 52. You have identified that?

A. Yes.

"—also being located at a level below the surface level of liquid in both said generator—"

They are the pipes that I have read pertaining to the exchanger and there all of them are below the level of liquid shown in the generating system, which is enclosed within the dotted line marked G.

"—(also being located at a level below the surface levels of liquid in both) * * * and said absorber,—"

48 Again the pipes I have read referring to the triple heat exchanger all lie below the liquid level in the absorber marked A.

"—and means for creating a third surface level of liquid in said circuit—"

That third level is in the vessel 24, enclosed within the dotted line marked RV.

"—below said exchanger"

The vessel 24 is below the bottom of the pipe 13 and pipe 15 for the purpose specified. That is, to permit the

liquid water to drain from the pipe 13 into the vessel 24.

"—to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit."

That I just explained. The drainage occurs from pipe 13 through the conduit 28 into the vessel 24 and then downward through the pipe 26 into the boiler.

R-D. Q. 53. The level in the reservoir 24 is below that portion of the heat exchanger through which the gas flows and in which the condensation occurs?

A. That is right.

R-D. Q. 54. Is there any possible use in putting this reservoir below the fluid conduits in which no condensation occurs?

A. No.

49 R-D. Q. 55. Please now apply Claim 39 to the Coons construction.

A. Again I read from Exhibit No. 6 for Claim 39:

"An absorption refrigerating system having a circuit for absorption liquid including—"

There is no question.

"—a generator—vapor lift assembly,—"

That consists of the vessel B, the pipe 11 and the vessel S, all within—all enclosed within the dotted line marked G.

"—an absorber"

That is the vessel A.

"—and heat exchange means,—"

That consists of the pipes 22, 26—22, 23-13 and 15:

"—said exchange means—"

That consists of the pipes numbered just as I have read them.

"—being connected to conduct vapors * * * from the generator,—"

That is conduit 12.

"—(being connected to conduct) * * * and liquid from the generator—"

That is conduit 22.

"—(being connected to conduct) * * * and liquid flowing to the generator—"

That circuit consists of pipes or conduits 23, 15,

50 and 25, vessel 24 and conduit 26.

"—in heat transfer relation out of physical contact with each other,—"

That consists of heat transfer that occurs between the fluids in the pipes whose numbers I have just read.

"—said exchange means—"

Again the numbers I have read apply to those pipes.

"—also being located at a level below the surface levels of liquid in both said generator-vapor lift assembly—"

The heat exchange means, which consists of pipes 22, 26, 22-23, 13 and 15 all lie below the surface level in the vessel S, which is a part of the generating assembly contained within the dotted line marked G.

"—(also being located at a level below the surface levels of liquid in both) * * * and said absorber,—"

The heat exchange means included within the dotted line HE consists of pipes whose numbers I have just read, likewise below the liquid level in the absorber A.

"—and means for creating a third surface level of liquid in said circuit—"

That level is within the vessel marked 24.

"—below a vapor portion of said heat exchange means—"

51 Pipe 24 is below 13.

In other words, the level in the vessel 24 must lie below the bottom of the pipe 13.

"—to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit."

For the reasons just stated above.

Mr. Sellers: Thank you, Doctor.

I shall, at this time offer into evidence as Plaintiff's Exhibit No. 1, the colored diagrammatic showing of the circulating system which is on the easel; as Plaintiff's Exhibit No. 2, the enlarged diagrammatic colored showing of the Bergholm patent, figure 1; as Plaintiff's Exhibit No. 3, the enlarged diagrammatic showing of the heat exchanger construction; as plaintiff's exhibit No. 4 the enlarged diagrammatic showing of the generating assemblies; as Plaintiff's Exhibit 5 the operating model which

we used; as Plaintiff's Exhibit No. 6 the chart showing the application of the claims of which Dr. Coons applied Claims 15 and 39.

As Plaintiff's Exhibit No. 7, the stipulation relative to photostatic copies and blue prints, et cetera.

As Plaintiff's Exhibit No. 8, the stipulated condensations of the file wrapper and contents.

As Plaintiff's exhibit No. 9, copy of the Hahnel patent 1,877,857.

52 As Plaintiff's Exhibit No. 11, the enlargement of figure 10, showing the older type compressor unit; and

As Plaintiff's Exhibit No. 12, the soft copy of the Mortensen Patent 1,854,619.

The Court: There being no objection, they may be received.

(Plaintiff's Exhibits 1, 2, 3, 4, 5, 6—(7 and 8 received page 10)—9, 11 and 12 received in evidence.)

Mr. Sellers: Do you care to cross-examine further?

Mr. Whitehead: Just two questions.

Recross-examination.

By Mr. Whitehead:

R-X Q. 1. I understood you to say that in the Coons application the heat exchange means is all located below the level of the liquid in the chamber 24.

Is that correct?

A. No, I don't believe I said that all of the heat exchange is located below that level.

R-X Q. 2. Well, is it all located below that level in the Coons' application?

A. No, not the heat exchange means.

R-X Q. 3. Now, about this Mortensen patent, I understood you to say that this disclosed a triple heat exchange?

A. I believe I did.

53 R-X Q. 4. Well, is that so described in the patent?

A. I think it is described as a heat exchanger in which three fluids are brought into heat exchange relationship.

R-X Q. 5. Is the expression "a triple heat exchanger" used in the patent itself?

A. I don't recall. I would have to refer to it.

Mr. Whitehead: The reason I am asking that question is because I understood counsel to ask if it was in the patent.

I may have been mistaken about that. I wish to clear it up if I misunderstood.

Mr. Sellers, you may correct me. I understood you to ask the question, was the triple heat exchanger described and disclosed in this draft?

Mr. Sellers: I don't believe, Mr. Whitehead, I said described and disclosed and claimed.

I was interested in determining whether triple heat exchangers were known in the art, and I asked if this did not show a triple heat exchanger.

Whether it describes and discloses the triple heat exchanger in full, I am not interested in that, but whether or not it shows a structure which is in effect a triple heat exchanger.

54 Mr. Whitehead: No further questions.

Mr. Sellers: One further question.

Further redirect examination.

By Mr. Sellers:

R-D. Q. 56. That Mortensen does show a three fluid triple heat exchanger?

Point out to his Honor whether he uses the term "triple heat exchanger" or not?

A. Yes, he shows and describes a device in which three fluids are brought into heat exchange, just exactly as in both of them.

R-D. Q. 57. In concentric relationship as in Bergholm?

A. That is correct.

R-D. Q. 58. Relative to Exhibit 1, Mr. Whitehead asked you was it a fact that the entire heat exchanger was above the liquid level in the reservoir 24—

Mr. Whitehead: I asked whether it was below.

The Witness: Yes, that is what he asked.

Mr. Whitehead: I understood him to say it was below the level in that chamber 24.

Mr. Sellers: The entire reservoir below the level here (indicating)?

The Witness: No. I understood Mr. Whitehead
55 to ask whether the heat exchanger was entirely below the level of liquid in the vessel 24.

Mr. Whitehead: Yes, that is what I asked.

Mr. Sellers: I have no further questions to ask about that.

By Mr. Sellers:

R-D. Q. 59. Is it not a fact, Dr. Coons, that the gas conduit part of the heat exchanger is above the liquid level in the reservoir 24?

A. That is correct.

R-D. Q. 60. Is it important that that be above?

A. Yes, it is important, and it is unimportant where the other pipes of the heat exchanger lie.

Mr. Sellers: Thank you.

The Court: You are excused.

(Witness excused.)

Mr. Sellers: Your Honor, after due notice to the solicitor for the Commissioner, we took the deposition of Mr. Muffly, the past president of the American Society of Refrigeration Engineers.

That deposition has been filed and we wish to make use of it as a part of our evidence.

That deposition covers much the same ground as Dr. Coons has been over. Our normal procedure, in the Seventh Circuit, would be to read that into the record.

The Court: You can offer it in evidence and the
56 Court will read it when it takes the case under advisement. Where is the deposition?

Mr. Sellers: The deposition has been filed in the case. I wish to have it marked as Plaintiff's Exhibit No. 10.

The Court: Glenn Muffly?

Mr. Sellers: Yes, sir.

The Court: It will be received into evidence.

Mr. Sellers: You prefer that we not read it in?

The Court: I can read it much faster than you could read it in court.

Mr. Sellers: Yes, your Honor.

Then we will not read it. I will merely offer that as Plaintiff's Exhibit No. 10.

Mr. Whitehead: No objection.

The Court: Very well.

That will be received in evidence.

(Plaintiff's Exhibit 10 received in evidence.)

Mr. Sellers: That comprises the direct case for the plaintiff.

57 **Evidence on Behalf of the Defendant.**

Mr. Whitehead: I want to introduce in evidence the folder, which I handed to your Honor this morning, as defendant's Exhibit No. 1.

Mr. Sellers: I have no objection.

The Court: It may be received.

(Defendant's Exhibit 1 received in evidence, containing:

A—Bergholm 2,201,362;

B—Prints of Drawing;

C—Examiner's Statement;

D—Supplemental Examiner's statement;

E—Decision of the Board of Appeals;

F—Decision of the Board of Appeals on Petition for Reconsideration.)

Mr. Whitehead: That is all.

Mr. Sellers: I have nothing further.

The Court: That closes all the testimony in the case?

Mr. Sellers: It does, your Honor.

The Court: Do you want a few minutes to sum up the case on each side?

Mr. Sellers: Yes.

58 **Summation on Behalf of the Plaintiff.**

By: Mr. Fitzsimmons.

Mr. Fitzsimmons: Your Honor, we have shown by demonstration of the physical embodiment of the Coons' disclosure, and the testimony of Dr. Coons, who is eminently qualified to testify as an expert in this art, that the boiler B per se is full of liquid.

We have also shown by the testimony of Dr. Coons and Mr. Muffly, who is past president of the American Society

of Refrigerating Engineers, that any indistinct point of separation between the liquid and the vapor in the boiler B or the tube 11 has no functional significance in this case.

We have also shown by the gauge glasses on the physical exhibit and by the testimony of Dr. Coons that there is a level in the absorber A, there is a level in the gas separation vessel S, and a level in the reservoir RV, which levels are the only levels of importance in the system.

The patent office rejected claim 39 on that sole ground, stating that in view of the fact that plaintiff showed two liquid levels in the generating assembly, which consists of the boiler B, the conduit 11, and the gas separation chamber S, the claim had no meaning.

With the Court's permission may I read claim 39 on the physical exhibit:

"An absorption refrigerating system having a cir-
59 cuit for absorption liquid including a generator-vapor lift assembly,—"

The liquid circuit is the conduits 22 and 23, the absorber, conduits 15 and 13, and the generator-vapor lift assembly comprises the gas separation chamber S, boiler B and conduit 11.

"—an absorber"

The absorber A.

"—and heat exchange means,—"

Comprising the conduits 22 and 23, where they come into heat exchange relation; and conduits 13 and 15, where they come into heat exchange.

"—said exchange means being connected to conduct vapors from the generator."

Vapors from the generator flow by conduit 12 to the conduit 13.

"—and liquid from the generator—"

Flows from the Vessel S into heat exchange with both conduits 26 and 23,

"—and liquid flowing to the generator—"

Liquid flowing to the generator from the absorber flows through conduit 23 through the heat exchanger and through the conduit 15, vessel 24, conduit 26, back to the generator.

"—said exchange means also being located at a
60 level below the surface of liquids in both said generator-vapor lift assembly and said absorber,"

The heat exchange means of the system outlined by the dotted line HE is obviously below a level in the absorber and below a level in the vapor separating chamber S.

"—and means for creating a third surface level of liquid in said circuit below a vapor portion of said heat exchange means to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit."

The only reason the vapor portion is above this vessel (indicating) is so that the vapor condensed therein can flow by gravity to the liquid circuit.

It is submitted that there should be no question as to the readibility of claim 39 on the Coons construction.

We have also shown by the testimony of Dr. Coons and Mr. Muffly that both Coons and Bergholm have had a common problem and it is submitted that we are entitled to an interference with that patent, if not upon the other Claims, upon Claim 39.

We have shown by the testimony of Dr. Coons and Mr. Muffly that the term "Triple heat exchanger" as used by Bergholm means the provision of means for the flow of three fluids, two of which are in heat exchange with
61 the third, and that Coons has such an exchanger.

We have also shown by the testimony of Dr. Coons and Mr. Muffly, with reference to Plaintiff's Exhibit 3 that the heat exchanger of Coons is the exact equivalent of that of Bergholm.

We have also shown, by the testimony of Dr. Coons and the patent of Hahnel, that in the refrigeration art to which both the Coons and Bergholm's patents relate, that "a generator" comprises:

1. a place where heat is applied to drive refrigerant vapor from the strong solution,

2. a vapor lift pump which utilizes the vapor thus produced to raise the weakened solution to a

level from which it can flow through the remainder of its circuit by gravity, and,

3. a place of separation where the vapor and solution separate by gravity.

We have also shown that the boiler B tube 11 and vessel S of Coons constitutes a generator in the same sense as Bergholm's heating coil 30, the tube rising therefrom and the vessel 10.

We have also shown by the physical exhibit and by the testimony of experts that the heat exchanger of Coons is below the liquid level in the absorber and below the
62 liquid level in the gas separation chamber.

We have also shown that the only liquid level in the generator having any significance is the level in the gas separation chamber.

Mr. Whitehead said that the doctrine of equivalents does not apply in this case and I would like to call the attention of the Court to the case of Monopower Corp. et al v. Coe 46 USPQ 403, 33 F.S. 934.

In that case, as in this, the claim was copied from a patent and was an action under R.S. 4915 to test the holding of the Patent Office, that the claim would not read on the plaintiff's disclosure.

The question arose in that case as to whether a gear slidable upon a splined shaft to mesh with other gears would respond to the term "Clutch" as required by the claim and whether or not the slidable gear sliding from one to another provided a continuous transmission of power.

The Court said: "The two mechanisms are designed to accomplish—changes of speed—and without interruption in the flow of power. Thus each structure does by means which, if not identical, serve the same identical purpose. It could hardly be thought that, if either of these structures appeared in the prior art, the other one would be considered patentable. Where two or more parties claim 'substantially' the same patentable invention,
63 the rules of the Patent Office provide for an inter-

ference proceeding, instituted for the purpose of determining the question of priority of invention between such parties.—Where an applicant discloses a mechanism which performs a new and useful function by such substantially similar mechanical operation as a mechanism disclosed in an application subsequently filed, there should be, by some apporpriate means, a determination as to priority of invention before a patent is denied to the first applicant. And while due regard should be given to the meaning of the terms used in claims proposed for a proceeding to determine that priority, the determination of who is the first inventor should not be frustrated by putting the entire emphasis upon the exactitude of terminology employed in the claim."

That case was decided by the U. S. District Court for the District of Columbia.

I also call to the Court's attention too the following other decisions:

Bechtold v. Lanser 29 USPQ 130, 82 F. (2nd) 415 and Wiegel v. Hobbs 87 F (2d) 496.

Hydraulic Press Corp. Inc. et al v. Coe 56 USPQ 437.

Your Honor, it is submitted that each and all of the claims involved in this interference read upon the
64 Coons construction and that an interference should be instituted for the determination of priority.

The Court: This application was first filed in the Patent Office when?

Mr. Fitzsimmons: The Coons application, original application was filed in 1936; the Bergholm in 1937.

The Court: Now then, the Coons application, were certain of the claims granted?

Mr. Fitzsimmons: There are claims allowed in the case.

The Court: How many?

It doesn't make much difference, but how many, about?

Mr. Fitzsimmons: I should say there are at least 14 or 15.

The Court: Claims allowed?

Mr. Fitzsimmons: That is right.

The Court: He has received a patent on certain claims?

Mr. Fitzsimmons: I think there are 9 in the patent as issued.

The Court: Now then, in that same proceeding, certain claims were denied, is that right?

Mr. Fitzsimmons: Not in that proceeding.

The Court: That is what I wanted to find out. In another application?

Mr. Fitzsimmons: We re-issued the patent and
65 copied claims from the Bergholm for the purpose of interference.

The Court: And those are the claims before the court now?

Mr. Fitzsimmons: That is right.

The Court: So then, your idea is that since the Patent Office has refused to grant these four claims that you have here, this court should find in favor of the Plaintiff and it would be in a position to have interference with Bergholm?

Mr. Fitzsimmons: That is right.

The Court: If I find against you, why, you go to the Court of Appeals and if they found against you, why, then you could not have your interference.

Mr. Sellers: May I add just a word, your Honor, to what my co-counsel has said, to this effect, that here we have a single application before us and this whole question is whether or not we can read these four claims upon our construction.

It is a fact that certain of these claims, not all of them—for example, claim 39 is not taken from the Bergholm patent and it reads, beyond a doubt, upon our construction in our opinion, and is not actually taken from the Bergholm patent.

Claim 15, however, is taken from the Bergholm Patent.

The question is whether or not we can copy that
66 claim now in the Bergholm Patent and our position is that this claim, without limiting the interpretation of the terms in any way, but giving to them their normal meaning, reads upon our construction directly, that there is no real need, in such a case, for resort to the Patent.

Those claims are allowed.

If they read upon our construction clearly, when giving the terms their normal meaning, it is almost elementary that they should stand allowed in our patent.

The Patent Office will have to set up the interference, to be sure, but the Court held, in Hydaulic Press Corp. Inc., et al., v. Coe, decided by the Court of Appeals in this District, that the claims must be given the broadest interpretations to which they are reasonably susceptible.

Now, if there is any doubt as to the meaning of the terms used, then it is reasonable to return to the Bergholm patent and see what those terms mean, but here there is no doubt they read just as well upon our construction as upon Bergholm's.

There is no necessity for doctrine of equivalents. We have the exact things called for.

67 **Summation on Behalf of the Defendant.**

By Mr. Whitehead:

Mr. Whitehead: Your Honor, these four claims are composed of two groups.

One, claim 15 is copied accurately from the Bergholm Patent.

The other—the other three—two of them—I think it is all three of them were slightly modified claims based on the claim of the Bergholm patent.

Now, the point on that is, as I called your attention in a case not long ago, the practice grew up in the Patent Office of allowing an interference between a Patent and an Application where the applicant could not make the claims of the patent literally because of some immaterial limitations, in which the issue would be a claim of the patent with those limitations omitted.

Now, so far as I know, I know of no case in which claims copied from a patent have been allowed to an applicant where they did not literally read on the application.

The Court of Customs and Patent Appeals has repeatedly held that you could not have an interference where claims of the patents didn't read on the application and that the doctrine of equivalents was not material.

Now, as far as this question of the triple heat exchanger is concerned, in the Bergholm Patent that arrangement of concentric pipes is defined as a triple heat exchanger.

68 I may say the citation of this Mortensen patent No. 1,854,619 by plaintiff simply confirms the obvious position that that is what a triple heat exchanger is, and when your pipes are arranged in three different groups, as shown in that chart, those three do not make a triple heat exchanger.

Now, they may, in the end, accomplish the same purpose, but that does not make the claim allowable in the application.

So far as this question of levels is concerned, if you are going to take three groups and call them a triple heat exchanger, and then say that they are above or below a certain level, when some of them are, and some of them are not,—the thing that is characterized by a triple heat exchanger in the Bergholm patent, the level of the pipes or with reference to these surface levels, was specified.

If you are going to take a group of three, all of which are not below a certain level, and say that they constitute a triple heat exchanger, the whole of it is certainly not below nor above, whichever way you put it.

There are one or two things I would like to call your attention to, if I may, about this testimony of Mr. Muffly which was introduced here.

On the bottom of page 26 this question was asked:

> "Question: Can you state, Mr. Muffly, how the Coons heat exchanger assembly would be constructed
69 and insulated if made in accordance with general practice?"

Now, without saying anything about what the general practice is, he says:

> "Answer: The heat exchanger assembly including all parts within the broken line identified by the letters IIE would be enclosed within one continuous body of insulating material, and the broken line IIE maybe considered as the outline of such a body of insulation."

I don't know what the practice is and I don't think your Honor knows. What was the established practice? It was just a conclusion of his as to what the established practice was.

Now, again on page 19, he said:

> "Comparing the two constructions, the boiler B of Coons is the equivalent of the heating coil 30 of Bergholm."

I call your attention to it just to emphasize that the whole theory of this case is predicated, as I see it, on the doctrine of equivalents and not on the doctrine of direct readability of the claims on the Coons application.

Now again, on page 15 the question is asked:

> "Question: Would it be fair to say that functionally Coons and Bergholm heat exchangers are identical and differ merely in immaterial structure details?"

Now, again we are coming back to the question of
70 identity, a question of identity of structure, not to the question of functional identity, and these are physical claims, claims for a physical structure.

Now, as I understand, from the reading of the citations, cited, there they had two applications and not an application and a patent already issued. As I said in the beginning, one means the establishment of an interference when it gets back to the Patent Office in a modified claim and the other means an establishment of interference on the basis of the claims which read directly upon the application.

That is the issue in this case.

71 Mr. Fitzsimmons: Mr. Muffly testified that in actual practice the heat exchanger would be all embedded within one body of insulation.

Mr. Muffly is eminently qualified in refrigeration art and as a matter of fact, it would be.

Apparently Mr. Whitehead is stressing the fact that the doctrine of equivalents should not apply in this case and otherwise, he does not contest it.

However, the Monopower Corp. et al v. Coe, to which I called your Honor's attention awhile ago, was an action under R.S. 4915 where a claim was copied from a patent as in this case.

The Court there admitted that the claim did not read literally on the application and it still allowed the applicant to make it.

I think that is all I care to say.

The Court: The Court will take the case under advisement and counsel will be notified of the decision of the Court.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company, *Plaintiff*, v. Conway P. Coe, Commissioner of Patents, *Defendant*.	Civil Action 15,028.

The Deposition of Glenn Muffly, taken on behalf of the plaintiff in the above entitled case before William C. Meyer, a Notary Public of Cook County, in the State of of Illinois, acting within and for the County of Cook and State of Illinois, on the 30th day of March A. D. 1943 commencing at ten o'clock A. M., at 2300 No. 8 South Michigan Avenue, Chicago, Illinois, pursuant to the notice attached hereto.

Present:

Mr. W. D. Sellers and
Mr. R. R. Fitzsimmons,
appeared for plaintiff.

Defendant was not represented by counsel.

2 **Glenn Muffly**, called as a witness on behalf of plaintiff, having been first duly sworn, testified as follows:

Direct examination.
By Mr. Sellers:

Q. Will you please state your name, address and occupation?

A. Glenn Muffly; Springfield, Ohio; consulting engineer in refrigeration, which has been my principal occupation for the past 18 years. I was formerly Chief Engineer of Copeland, Incorporated, one of the pioneer manufacturers of mechanical refrigerators. I am a member of the American Society of Refrigerating Engineers, and have

been National President of this society. I am a registered mechanical engineer in the State of Ohio, and I am President of the Springfield section of the Ohio Society of Professional Engineers.

My consulting work in refrigeration includes analysis of patents, and I have frequently given expert testimony in patent suits concerning refrigeration. I have had over fifty U. S. patents issued on my applications, mainly pertaining to refrigeration.

I am General Chairman of the Joint Committee
3 on Rating Comercial Refrigerating Equipment, this Joint Committee being sponsored by the American Society of Refrigerating Engineers, and includes members from several other organizations in this field.

I am a member of the Standards Committee of the A. S. R. E., and a member of the American Standards Association's Sectional Committee B-9, on refrigeration safety standards.

During ~~my~~ employment by Copeland Products Inc. as Chief Engineer I had charge of laboratory and development work, and later have carried on private development work in my own laboratory, as well as supervising development work in the laboratories of my various clients in refrigeration.

Q. Mr. Muffly, are you familiar with the Coons invention as disclosed in the Coons patent 2,178,870, and in the application serial No. 373,970, here before the Court?

A. Yes, I have studied the patent and the application.

Q. Will you please describe that invention, referring in particular to Plaintiff's Exhibit No. 1, which I have placed upon the easel?

4 A. This drawing is a duplication of the patent drawing with the important parts enlarged: that is, the patent with which we are concerned.

The refrigerant which has been condensed in the condenser C, and evaporated in the evaporator E flows as vapor into the absorber A, where the gas, in this case ammonia, is absorbed by the weak aqua solution, called weak liquor, thus forming strong aqua ammonia, which is called strong liquor, strong aqua or rich solution. This

strong liquor leaves the absorber through the tube 23 and flows to the boiler B through the intermediate passages colored red on the drawing. The boiler B is a part of the generator indicated on the drawing as G.

The purpose of the generator is to generate refrigerant vapor by evaporation from the strong solution, and further to separate this vapor from the remaining solution which now becomes weak liquor, and is indicated by the color blue on Plaintiff's Exhibit No. 1.

The tube 11 is the conduit of the generator carrying both liquid and vapor from the boiler B to the separator S, as indicated on the drawing by intermittent yellow for gas and blue for liquid. Due to the lighter weight of the gas, this column of intermittent gas and liquid in the tube 11 flows upwardly into the separator S by virtue of the liquid head established in the reservoir 24, as indicated by the liquid level where red and yellow meet.

The ammonia vapor indicated by the color yellow now leaves the generator through the tube 12, and after passing in heat exchange with the strong liquor goes to the condenser where it is condensed, and the circuit of the refrigerant is completed. In the meantime the weak liquor returns from the generator to the absorber by way of the tube 22 which is in heat exchange with the strong liquor.

Aside from the mention of heat exchange, the foregoing is merely to outline briefly the operation of an absorption system.

Q. Are you familiar, Mr. Muffly, with the invention disclosed in the patent to Bergholm, 2,201,362; and if so, will you please describe that invention, referring particularly to Plaintiff's Exhibit No. 2, which comprises an enlarged colored reproduction of that part of Figure 1 of the Bergholm patent in which we are particularly interested?

A. Yes, I have studied this patent, and find that this Exhibit No. 2 duplicates the Bergholm Figure 1 except for the condenser and the evaporator.

The cycle of operation of this system includes evaporation of ammonia in the evaporator, not shown in the exhibit drawing, but included in the patent drawing. The

cold ammonia vapor resulting from this evaporation flows downwardly, through the tube 13, which is a part of the absorber indicated in general by the letter A; as in the Coons patent, this ammonia vapor combines with this weak liquor to form strong liquor, as indicated by the red flow downwardly in tube 13, and the body of the red liquid in the accumulator or sump 14. The strong liquor, indicated in red, flows through the passage 24 to the generator indicated by the letter G, and boiling of the strong liquor starts in the coil 30, which is heated by the burner 11. This boiling generates ammonia vapor, and, as in Coons, the ammonia vapor and liquor, which is now shown by the color blue to indicate that it has been weakened by the loss of the ammonia vapor, flows upwardly in the tube at the right.

7 This upward flow results from the low average density of the intermittent blocks of liquid and vapor, as in the Coons patent.

In the upper portion of the generator the liquid and vapor are separated by gravity, and we see solid yellow to indicate ammonia vapor in the top of the generating assembly. This ammonia vapor flows from the generator through the tube 31 downwardly into the reservoir R V, and from this reservoir through passages 25 and 26 to the condenser identified as 18 in the patent drawing, but not shown in this exhibit. The portion 25 of this gas passage is a part of the heat exchanger indicated in general by the letters H E.

As in Coons, the weak liquor returns from the generator to the absorber by way of the heat exchanger, the path through tubes 34, 23 and 35 being indicated in blue. As the blue weak liquor enters the absorber it begins to absorb ammonia vapor, and the color changes to red to indicate strong liquor.

Q. Mr. Muffly, do you have an opinion concerning the basic relationship of the Coons and Bergholm constructions

A. Yes. I would say that they are substantially the same. The functional operation is the same. The

8 arrangement of parts is slightly modified.

Q. Did Coons and Bergholm have a common problem; and if so, how did they solve that problem?

A. They had a common problem in their objective of economy by the conservation of energy. Prior to these patent applications the practice was to cool the hot vapor, which leaves the generator, as through tube 12 of Coons or tube 31 of Bergholm, by the dissipation of heat to air or to water. Coons and Bergholm both provided means for conserving this by transferring it to the strong liquor which is flowing from the absorber to the generator. This provides for cooling the ammonia vapor, and instead of wasting the heat, it is added to the strong liquor which must be still further heated in the generator to boil vapor out of it. In addition each provides for returning liquor condensed out of the vapor to the generator, this condensate combining with the strong liquor in the reservoir 24 of Coons and in the reservoir 28 of Bergholm. In this reservoir in each patent there is a liquid level located below that portion of the heat exchanger in which condensate is removed from the vapor. This establishment of an additional liquid level to provide for the drainage and return of strong liquor to the generator is accomplished in the same manner by both Coons and Bergholm.

While the exchange of heat from the hot weak liquor to the cooler strong liquor is old in the art of refrigeration, both Coons and Bergholm have shown a novel feature in conducting the strong liquor into heat exchange with the weak liquor prior to conducting the strong liquor into heat exchange with the hot vapor. If the strong liquor were conducted immediately into heat exchange with the vapor without this preliminary heating there would be a part of the ammonia vapor condensed as well as the condensing of water vapor out of the ammonia vapor. It is desirable to remove the water vapor from the ammonia, but not to condense the ammonia vapor before it reaches the condenser. Both Coons and Bergholm have provided for preheating the strong liquor so that it does not overly cool the ammonia vapor and thus short circuit its path.

Q. I refer you now, Mr. Murray, to Plaintiff's Exhibit No. 3, which shows two columns of figures, the left hand column relating to the Coons construction and the right

hand column to the Bergholm construction, the upper figure in each column being a substantial reproduction of the heat exchanger found in Figures 1 of the Coons and Bergholm patents. The Coons figures have been numbered 1 to 3 and the Bergholm figures 1-A to 3-A.

Q. Will you please discuss and compare the heat exchangers of Coons and Bergholm with particular reference to this exhibit?

A. In the upper Coons Figure 1 we see the strong liquor flowing through 23, 15 and 26, in that order, on the way to the generator. Below this we see the weak liquor flowing to the left through the tube 22. We also see a portion of the path of the ammonia vapor which enters at 29 and flows upwardly through the rectifier 13 to exit at the top on its way to the condenser. We also see the drain 28 for condensate collecting in the rectifier 13.

At the right under Bergholm we see in Figure 1-A, which is likewise a replica of a portion of the patent drawing, the conduit 24 carrying strong liquor from left to right, and the conduit 23 carrying weak liquor from right to left, these two conduits being in heat exchange with each other. We also see a portion of the path of the ammonia vapor which enters at 27 and flows through the passage 25, passing out at the upper left of this passage on the way to the condenser. The inlet passage 27 also serves as a drain outlet for condensate equivalent to the drain outlet 28 seen in Coons.

While Coons has shown one of his conduits 15 as an annular conduit, and Bergholm has shown two of his conduits 24 and 25 as annular conduits, this shape of the conduit is not a feature of the invention.

The important points of similarity are that both Coons and Bergholm bring the strong liquor into heat exchange with the weak liquor first, then into heat exchange with the vapor, and finally again into heat exchange with the weak liquor only. The strong liquor is indicated by the color red and the weak liquor by the color blue in all of the figures on the sheet. The refrigerant vapor is indicated by the color yellow in all six of these figures.

The Coons and Bergholm heat exchangers are shown in simplified form in Figures 2 and 2-A respectively. In these simplified figures the passages are all shown as simple tubes rather than any one of them surrounding another. While Coons shows one annular passage 15 and Bergholm shows two annular passages 24 and 25, the shapes of these passages are of no moment, the
12 only important consideration being the provision of ample contact areas for transfer of the amount of heat involved at the temperature difference available. In Figures 2 and 2-A, it is assumed that each provides ample contact for heat transfer. Then the simplified figures emphasize the fact that Coons' tubes 13 and 22, are not directly in heat transfer with each other, and that likewise Bergholm's tubes 25 and 23 are not arranged in heat transfer with each other. The red strong liquor separates the blue weak liquor from the yellow vapor in both cases the same as in Figures 1 and 1-A.

The Figures at the right and left are connected by dotted lines representing a common level. Both Coons and Bergholm have located their drainage outlets from the hot vapor passage at a suitable level above the reservoir into which condensate is to be drained, these outlets being 28 in Coons and 27 in Bergholm. Necessarily the liquid level in the reservoir to which the drain leads must be below Coons' conduit 13 or Bergholm's conduit 25. The levels of conduits 22 of Coons and 23 of Bergholm do not enter into the problem, as they would convey their liquids at whatever level might be convenient to arrange them.
13 It is only necessary that Coons' conduit 23, 15, 26, and Bergholm's conduit 24 be of such shape and location to include heat transfer with the upper yellow tube of vapor and also with the lower blue tube of weak liquor. It is therefore convenient for comparison to consider Figures 3 and 3-A, in which Coons' tube 23, 15 and 26, is shown straight. In both of these Figures 3 and 3-A, we see that the strong liquor and weak liquor are in heat exchange with each other, then the vapor conduit comes into heat exchange with the strong liquor, and finally only the strong liquor and weak liquor lines are in contact with

each other. The common level indicated by the dotted line still retains the outlets 28 of Coons and 27 of Bergholm at a point above the level of liquid in the reservoir to which they drain the condensate from the vapor line.

No change has been made in the function of either Coons or Bergholm in this analysis of their disclosures. It is obvious that Figure 3 is arranged to operate exactly the same as Figure 1, and that Figure 3-A is arranged and operates exactly the same as Figure 1-A. Figures 3 and 3-A are identical.

Thus Figures 1 and 1-A are exact equivalents.

Q. In what sense does Bergholm have a "triple heat exchanger"?

A. Bergholm has a heat exchanger through which three fluids flow, and he calls it a "triple heat exchanger" because of this. It is obvious that Bergholm's heat exchanger involves only two pairs of passages, since his passage 23 is not in heat exchange with his passage 25.

Q. Will you please give the numbers of the two pairs, Mr. Muffly?

A. Bergholm has one pair comprising 23 and 24. His second pair comprises 24 and 25.

Q. Does the vapor in conduit 25 ever contact the weak liquid in conduit 23?

A. No. It neither contacts nor exchanges heat with the liquid in 23.

Q. Does Coons have a triple heat exchanger in the sense that Bergholm has?

A. Yes, Coons has exactly the same heat transfer effects, the passage 23, 15, 26 being in heat exchange with both the vapor passage 13 and the weak liquor passage 22. And, as in Bergholm, Coons has no heat exchange between his vapor passage 13 and his weak liquor passage 22.

Q. Is it accurate to state, Mr. Muffly, that both Coons and Bergholm are characterized by the presence of passageways for three fluids, one of which never comes in contact or into heat exchange relationship with one other passageway?

A. Yes, each has a passageway entirely out of heat exchange with one of the other passageways.

Q. Is it not a fact that in both the Coons and Bergholm constructions, as illustrated in Exhibit No. 3, the strong and weak fluids are in heat exchange relationship both before and after the heat exchange relationship between the strong liquid and the refrigerant vapor?

A. Yes, that is right.

Q. Is it not also true that the refrigerant vapor in both Coons and Bergholm never comes into heat exchange relationship with the weak liquid?

A. That is right.

Q. Would it be fair to say that functionally Coons and Bergholm heat exchangers are identical, and differ merely in immaterial structural details?

A. Yes, I would say that is correct.

Q. What are the three liquid levels in the Coons and Bergholm construction, Mr. Muffly?

A. In the Coons patent we have a liquid level near the bottom of the absorber where the red begins, and we have a liquid level in this reservoir 24, then we have a liquid level in the generator where the liquid accumulates providing the head of the liquid to force the weak liquor back to the absorber.

Q. Will you please identify the level in the generator more definitely, please?

A. The level of liquid is the level made by the line between the blue and the yellow in the upper part of the generator. This provides the liquid head for forcing the liquid back to the absorber.

Q. What is the vessel in which the liquid level appears in the generator unit? What reference character is that vessel indicated by?

A. The reference character S identifies the separating portion of the generator. In the Bergholm patent, as exemplified by Plaintiff's Exhibit No. 2, we see the liquid level in the absorber at the junction of the green and the red, the red being liquid accumulating in the absorber. We see the liquid level in the generator. We find the yellow above the blue at the upper part of the vessel 10,

17 and in the vessel identified by the letters R V we see the liquid level at the junction of the yellow and the red, the yellow representing vapor and the red representing the strong liquor, this level being below the chamber from which condensate drains.

Q. You have just stated, Mr. Muffly, that the liquid level in the reservoir R V or 28 in Bergholm is below the heat exchanger. How does that compare with the relationship of the liquid level in the reservoir R V or 24 in the Coons construction?

A. In the same way the reservoir R V in Coons is below the portion of the heat exchanger from which the drain occurs, so that the drainage is to this liquid level in the Coons the same as it is in Bergholm.

Q. Do I understand you to say that in each construction the reservoir liquid level is below that part of the heat exchanger from which drainage takes place?

A. That is right.

Q. Does that drainage take place from more than one part of either heat exchanger?

A. No, from only one.

Q. In the refrigeration field to which the Coons and Bergholm construction relate, what does a generator or generating assembly comprise, please?

18 A. It comprises a boiler or chamber in which heat is applied to the strong liquor to evaporate from it vapor, and a separating chamber in which gravity separates the evaporated vapor from the remaining liquid. Means must also be provided for the transfer of fluids from the boiling portion of the generator to the separating, and in both Bergholm and Coons we see this in the form of a vertical tube in which alternate vapor and liquid blocks of fluid rise because of the low average gravity of such interspersed liquid and vapor.

Q. I now refer you to Plaintiff's Exhibit No. 4, which discloses diagrammatic showings of the Coons and the Bergholm generating assemblies, and ask you to explain and compare these two constructions.

A. We have in Bergholm a chamber 28 corresponding to chamber 24 of Coons. This is the chamber into which

strong liquor and condensate flow, the liquid level in this chamber being below the portion of the heat exchanger from which the condensate flows in each case. This strong liquor flows into the boiler 30 of Bergholm or B of Coons, where evaporation is caused by the application of heat to release the vapor by means of which the remaining liquid is lifted vertically to the upper part of vessel 10 in Bergholm or vessel S in Coons, the liquid dropping to the bottom of this chamber and vapor collecting in the top.

Comparing the two constructions, the boiler B of Coons is the equivalent of the heating coil 30 of Bergholm. The vertical tube 11 of Coons is identical with the vertical tube 11 at the right of the figure representing Bergholm. The separator S of Coons serves the same purpose as the chamber 10 of Bergholm. The level of liquid in the chamber S of Coons corresponds to the level of liquid in the vessel 10 of Bergholm. The outlet for liquid 34 of Bergholm corresponds to the outlet for liquid 22 of Coons. The dotted extension on the lower part of the vessel S in Coons indicates that a change of depth of this vessel would have no effect on the liquid held in the tube 22. Functionally these two are the same.

Q. Where is the liquid level in the Coons and in the Bergholm generating assemblies?

A. We have the liquid level shown in Coons in the vessel S where the broken lines indicate liquid and the clear white space vapor. Similarly indicated is the liquid and vapor in Bergholm vessel 10, and between the two figures is a broken line indicating this level. The vessels 24 of Coons and 28 of Bergholm likewise have liquid levels in them, but these vessels are not a part of the generating assembly in either case. They are shown in these figures to illustrate the source of the fluid which flows to the generator through the tube 29 of Bergholm or the tube 26 of Coons, these tubes not forming part of the generating assembly. The generator of Bergholm begins at the coiled tube 30, and the generator of Coons begins where the tube 26 enters the boiler B.

Q. Are the liquid levels in the separator S of Coons and the chamber indicated at 10 in Bergholm the only levels having any functional significance in the operation of the generating assemblies?

A. Yes.

Q. Refer again to Plaintiff's Exhibit No. 1 and to Claim 39 of the Coons application. Will you please point out for the benefit of the Court how this claim is readable upon the construction, in your opinion?

A. Claim 39 reads, "An absorption refrigerator system having a circuit for absorption liquid,"

This refers to the entire system and its circuit.

21 "including a generator-vapor lift assembly",

This assembly is the one indicated generally by the letter G and inclosed within the dotted line in Plaintiff's Exhibit No. 1, including the boiler B, the vapor lift 11 and separator S.

"an absorber", the absorber is shown encircled by a dotted line as indicated by the letter A.

"and heat exchange means"; The heat exchange means is inclosed by the broken line indicated by the letters H E, including the tubes or passages 23, 15, 26, 22 and 13.

"said exchange means being connected to conduct vapors —from the generator", This connection conducting vapor from the generator is through the tube 12.

"said exchange means being connected to conduct—liquid from the generator," The liquid is conducted from the generator through the tube 22, this liquid being the weak liquor.

"and (to conduct) liquid flowing to the generator", The heat exchange means is connected to receive liquid through the vertical portion of the tube 23 at the left of the drawing,

this liquid being that which is flowing to the gen-

22 erator. This liquid leaves the heat exchanger through that portion of tube 26 which joins the boiler B outside of the enclosure made by the broken line identified as H E.

"in heat transfer relation out of physical contact with each other," The heat transfer relation referred to is that between the liquid in tube 23 and the liquid in tube 22;

also that between the liquid in 15 and the vapor in 13; also that between the tube 26, and the tube 22. These heat transfers are effected without the fluids involved coming into physical contact with each other.

"said exchange means also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber," We see the complete heat exchange means enclosed by the broken line H E located below the level in the absorber where the red and green join, and below the level in the generator-vapor lift assembly where the solid blue and solid yellow join within the chamber S.

"and means for creating a third surface level of liquid in said circuit below the vapor portion of said heat
23 exchange means to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit." The means for creating a third surface level is the receiver R V, or 24, its location and its connections, thus forming a surface level of liquid indicated by red below the yellow vapor within the chamber 24. This liquid level is in the liquid circuit and is located below the vapor portion of the heat exchanger identified by 13, into which vapor flows from the generator through the tube 12, and leaves through the tube 16 on its way to the condenser.

Q. Mr. Muffly, will you please apply Claim 15 of Coons which, incidentally, is Claim 7 of Bergholm, to the Coons construction as illustrated in Plaintiff's Exhibit No. 1?

A. This claim states "An absorption refrigeration system having a circuit for absorption liquid," Coons shows an absorption system and a circuit for absorption liquid.

"including a generator," The Coons generator includes those parts indicated by the letter G and surrounded by the broken line. This includes the boiler B, the vapor lift 11, and the separator S.

"an absorber," The absorber is that part inclosed
24 by the dotted circle and indicated by the letter A.

"and a triple heat exchanger," The triple heat exchanger is inclosed by the broken line indicated by the letters H E. This heat exchanger is "triple" because of handling three fluids.

"said exchanger being connected to conduct vapors and liquid from the generator," This heat exchanger receives vapors from the generator through the tube 12 which leads into the chamber 13. The heat exchanger also receives liquid from the generator through that portion of the tube 22 passing downwardly from the generating assembly at S and entering the broken line inclosure identified by the letters H E, within which inclosure this tube is part of the heat exchanger.

"and liquid flowing to the generator," The liquid flowing to the generator passes downward in the extreme left portion of the tube 23 and enters the heat exchanger where the tube 23 first come into contact with the tube 22. This liquid flows through the heat exchanger and leaves it through the tube 26 at the point where this tube leaves contact with the tube 22 just prior to its connection with the boiler B.

"in the heat transfer relation out of physical contact with each other," In each of the heat transfer portions of the heat exchange we find the fluids contained within conduits, the conduits being in physical contact with each other, but the fluids themselves not being in such contact.

"said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber," The heat exchanger assembly above defined is located entirely below the liquid level where green is seen joining red liquid in the absorber A, and below the level where yellow vapor joins blue liquid in the generator assembly.

"and means for creating a third surface level of liquid in said circuit below said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit." The means for creating this third surface level of liquid is the chamber 24, its connection and location. This receiver is located below the portion of the heat exchanger from which drainage occurs to permit such drainage of condensate from the vapor portion of the heat exchanger. From the level of red liquid within the receiver 24, identified generally as R V, the liquid circuit continues through a further portion

of the heat exchanger and thence to the generator. The path of condensate from the vapor portion 13 of the heat exchanger to the receiver is by way of the tube 28 which joins the tube 12.

Q. Can you state, Mr. Muffly, how the Coons generating assembly would be constructed and insulated if made in accordance with general practice?

A. The generating assembly, comprising the boiler B, the lift tube 11 and the separator S would be inclosed within one body of insulation as indicated by the broken line marked G.

Q. Can you state, Mr. Muffly, how the Coons heat exchanger assembly would be constructed and insulated if made in accordance with general practice?

A. The heat exchanger assembly, including all parts within the broken line, identified by the letters H E, would be inclosed within one continuous body of insulating material, and the broken line H E may be considered as the outline of such a body of insulation.

Q. In your opinion, Mr. Muffly, is the heat exchange assembly, or heat exchanger, of Coons, a single unitary construction?

27

A. Yes, I would call it a unitary construction.

By Mr. Sellers: The taking of testimony is concluded.

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Subscribed and sworn to before me this ..... day of April, A. D. 1943.

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Notary Public.

28 IN THE DISTRICT COURT OF THE UNITED STATES,

FOR THE DISTRICT OF COLUMBIA.

THE HOOVER COMPANY,
Plaintiff.

vs.

CONWAY P. COE, Commissioner of Patents,
Defendant.

CIVIL ACTION
15,028

State of Illinois, } SS:
County of Cook. }

I, William C. Meyer, a Notary Public, in and for the County of Cook and State of Illinois, do hereby certify that heretofore, to-wit, on the 30th day of March, A. D. 1943, personally appeared before me GLENN MUFFLY, at suite 2300, No. 8 South Michigan Avenue, Chicago, Illinois, a witness produced on behalf of the plaintiff in a certain action now pending and undetermined in the District Court of the United States for the District of Columbia, wherein the Hoover Company is plaintiff and Conway P. Coe, Commissioner of Patents, is defendant, Civil Action No. 15,028.

I further certify that the said witness was by me first duly sworn to testify the truth, the whole truth and
29 nothing but the truth in relation to the matters in controversy herein insofar as he should be interrogated concerning the same; that the testimony then given by him was by me reduced to writing, in the presence of the said witness, by means of shorthand, and thereafter transcribed upon a typewriter under my direction.

I further certify that after said testimony had been so transcribed, it was read over by the said witness, who then and there did subscribe and again make oath to the same.

I further certify that the taking of the deposition of GLENN MUFFLY, was in pursuance of the notice hereto attached and herewith returned.

I further certify that there were present at the taking of this deposition MR. W. D. SELLERS and Mr. R. R.

FITZSIMMONS, on behalf of plaintiff, and that defendant was not present in person nor represented by counsel.

I further certify that I am not a relative, employe, attorney nor counsel of any of the parties, nor a relative or employe of such attorney or counsel, and that I am not directly nor indirectly interested in the matter in controversy.

IN TESTIMONY WHEREOF I have hereunto set my hand and affixed my Notarial Seal this ..... day of April, A. D. 1943.

.....

.....ary Public.

My commiss'on expires
June 7, 1943.
Notary's Fee $.....

PLAINTIFF'S EXHIBIT NO. 6.

CHART

Claims	*Limitation*	*Bergholm*	*Coons*
15, 16, 38, 39	An absorption refrigerating system having a circuit for absorption liquid including—	(No question)	(No question)
15, 38	—a generator,—	10, 12, 30	B, 11, S
16, 39	—a generator vapor lift assembly,—	ditto	ditto
15, 16, 38, 39	—an absorber	13	A
15	—and a triple heat exchanger,—	(22) 23, 24, 25	22, 26-22, 23-13, 15
16	—and a heat exchanger,—	ditto	ditto
38	—and a three-part heat exchanger,—	ditto	ditto
39	—and heat exchange means,—	ditto	ditto
15, 16, 38	—said exchanger—	ditto	ditto
39	—said exchange means—	(22) 23, 24, 25	22, 26-22, 23-13, 15
15, 16, 38, 39	—being connected to conduct vapors from the generator—	by conduit 31, vessel 28 and conduit 27	by conduit 12
15, 16, 38, 39	—(being connect to conduct)—and liquid from the generator—	by conduit 34	by conduit 22
15, 16, 38, 39	(being connected to conduct)—and liquid flowing to the generator—	by conduits 33, 31 & 29 and vessel 28	by conduits 23, 15, 25, vessel 24 and 26
15, 16, 38, 39	—in heat transfer relation out of physical contact with each other,—	in (22) 23, 24, 25	in 22, 26-22, 23-13, 15
15, 16, 38	—said exchanger—	(22) 23, 24 25	22, 26-22, 23-13, 15

Claims	Limitation	Bergholm	Coons
39	—said exchange means—	(22) 23, 24, 25	22, 26-22, 23-13, 15
5, 38	—also being located at a level below the surface level of liquid in both said generator—	(22) 23, 24, 25 below liquid level in 10	22, 26-22, 23-13, 15 below liquid level in S
16, 39	—also being located at a level below the surface levels of liquid in both said generator-vapor lift assembly—	ditto	ditto
5, 16, 38, 39	—(also being located at a level below the surface levels of liquid in both)— and said absorber,—	(22) 23, 24, 25 below liquid level in 14	22, 26-22, 23-13, 15 below liquid level in A
5, 16, 38, 39	—and means for creating a third surface level of liquid in said circuit—	vessel 28	vessel 24
5, 38	—below said exchanger	28 is below (22) 23, 24 25	24 is below 13, 15 for purpose specified
16	—below a portion of said heat exchanger—	28 is below (22) 23, 24, 25	24 is below 13, 15
39	—below a vapor portion of said heat exchange means—	28 is below 25	24 is below 13
5, 16, 38	—to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.	25 drains to 29 by conduit 27 and vessel 28	13 drains to 26 by conduits 12, 28 and vessel 24
39	—to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit.	ditto	ditto

IN THE DISTRICT COURT OF THE UNITED STATES

FOR THE DISTRICT OF COLUMBIA.

The Hoover Company,
Plaintiff,

vs.

Conway P. Coe,
Commissioner of Patents,
Defendant.

Civil Action No. 15,028.

DESIGNATION OF RECORD.

Appellant hereby designates the following as the portions of the record, proceedings and evidence to be contained in the record on appeal in this case:—

1. Complaint.
2. Answer.
3. Stipulated Condensation of the file wrapper and contents of Coons application for patent Serial No. 373,970 identified as Plaintiff's Exhibit 8. Note that this item includes duplicates of all of Defendant's Exhibits 1-B, 1-C, 1-D, 1-E and 1-F.
4. Stipulation as to the use of printed copies etc. identified as Plaintiff's Exhibit 7.
5. Deposition of Glenn Muffly, identified as Plaintiff's Exhibit 10.
6. Reporter's Transcript of the Proceedings before the District Court.
7. Findings of Fact and Conclusions of Law.
8. Plaintiff's Proposed Findings of Fact and Conclusions of Law, filed in the District Court on June 15, 1943.
9. Judgment.
10. Notice of Appeal.
11. Designation of Record.

12. Plaintiff's Exhibit No. 1—colored diagrammatic showing of circulating system. (Physical.)
13. Plaintiff's Exhibit No. 2—enlarged diagrammatic colored showing of Figure 1 of Bergholm Patent No. 2,201,362. (Physical.)
14. Plaintiff's Exhibit No. 3—enlarged diagrammatic colored showing of the heat exchanger construction. (Physical.)
15. Plaintiff's Exhibit No. 4—enlarged diagrammatic showing of the generating assembly. (Physical.)
16. Stipulation dated July 19, 1943 substituting photographs Plaintiff's Exhibits 5A and 5B for Plaintiff's Physical Exhibit No. 5.
17. Plaintiff's Exhibit No. 6—chart showing the application of the claims of which the witness Coons applied claims 15 and 39.
18. Plaintiff's Exhibit No. 9—copy of the Hahnel Patent No. 1,877,857.
19. Enlargement of Figure 10 of the Oswald Patent No. 1,482,028. (Physical.) Plaintiff's Ex. No. 11.
20. Plaintiff's Exhibit No. 12—copy of the Martensen Patent No. 1,854,619.
21. Defendant's Exhibit 1-A—copy of Bergholm Patent No. 2,201,362.
22. This Designation of Record.

W. D. Sellers,
Richard Fitzsimmons,
Attorneys for Plaintiff.

Washington, D. C.
July 19, 1943.

Service of the foregoing Designation of Record, and receipt of a copy thereof acknowledged this 19th day of July 1943.

W. W. Cochran,
Attorney for Defendant.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company,
Plaintiff,

vs.

Conway P. Coe,
Commissioner of Patents,
Defendant.

Civil Action No. 15,028.

SUPPLEMENTAL DESIGNATION OF RECORD.

Appellant hereby designates the following additional portions of the record, proceedings and evidence to be contained in the record on appeal in this case:—

22. Stipulation re transmission of original Exhibits to the Court of Appeals.
23. Order authorizing transmission of original Exhibits to the Court of Appeals.
24. Stipulation re extending time in which to file certified transcript of the record.
25. Order extending time for filing certified transcript of record.
26. This Supplemental Designation of Record.

Omit item No. 8 of the original Designation of Record, re "Plaintiff's Proposed Findings of Fact."

Washington, D. C.
August 13, 1943.

Wm. S. Hodges,
900 F Street N. W.
Of Counsel for Plaintiff.

Certificate of Service.

I hereby certify that a copy of the above Supplemental Designation of Record has this day been mailed to W. W. Cochran, United States Patent Office, Department of Commerce Building, Washington, D. C., attorney for defendant.

Dated August 13, 1943.

WM. S. HODGES,
Of counsel for plaintiff.

PLAINTIFF'S EXHIBIT NO. 7.

IN THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

The Hoover Company,
Plaintiff,

vs.

Conway P. Coe,
Commissioner of Patents,
Defendant.

In Civil Action
No. 15028.

STIPULATION.

It is hereby stipulated and agreed by and between counsel for the respective parties as follows:

1. That copies hereto attached are correct condensations of the file wrapper and contents and drawings of the following application for United States Letters Patent:

Curtis C. Coons, Serial No. 373,970 filed Jan. 10, 1941, application for original patent No. 2,178,870 filed Aug. 8, 1936; and

2. That the above condensations of the file wrapper and contents and drawings of the said application may be received in evidence in lieu of the complete file wrapper and contents or certified copies thereof, subject to correction should any error be found.

(Signed) RICHARD R. FITZSIMMONS,
W. D. SELLERS,
Attorneys for Plaintiff.

Chicago, Illinois,
Mar. 18, 1943.

.....
Attorney for Defendant.

Washington, D. C.
....., 1943.

INDEX.

To All Whom It May Concern:

Be it known that I, Curtis C. Coons, a citizen of the United States, residing at North Canton, in the County of Stark, and State of Ohio, have invented certain new and useful Improvements in

CONTINUOUS ABSORPTION REFRIGERATING SYSTEM

of which the following is a full, clear and concise description:

This invention relates to continuous absorption refrigerating systems and more particularly to rectifiers and heat exchangers adapted to be used therein.

In the operation of a known type of continuous absorption refrigerating system using inert gas, approximately one fourth of the heat input to the boiler is discharged at the rectifier. The heat that is discharged from the rectifier to the cooling medium such as the air, in an air cooled absorption system is relatively high grade heat-energy. If this heat is discharged to the cooling medium or to other than a part of the refrigerating system, the heat ratio of the refrigerator is not high.

By means of the present invention, it is proposed to provide a continuous absorption refrigerating system in which this heat of rectification is discharged into the strong aqua or strong solution flowing from the absorber to the boiler, thereby improving the heat ratio.

It is preferable in accordance with the present invention to discharge the heat of rectification to the strong aqua instead of to the weak aqua due to the fact that the quantity of strong aqua flowing is larger than the quantity of weak aqua by the amount of refrigerant absorbed in the absorber. Because of this it is not as practical to transfer the heat of rectification to the weak aqua.

Accordingly it is one object of the present invention to effect a savings of heat and to bring about an improvement in the heat ratio of a continuous absorption refrigerating system by transferring heat from the rectifier to the strong aqua flowing to the boiler.

It is still another object of the invention to provide an improved heat exchanger for transferring heat in the fluid leaving the boiler of a continuous absorption refrigerating system to fluid entering the boiler of that system.

It is still another object of the invention to provide an improved rectifier adapted for use in a continuous absorption refrigerating system.

In the following description, means is described for discharging heat of rectification to the strong aqua in the system. In all of the arrangements shown and described a single stage continuous absorption system using inert gas is illustrated but it is obvious that the rectifier and associated parts may be used in absorption systems which do not employ inert gas and also in systems in which two or more stages are employed. It will also be clear to those skilled in the art that the rectifier of one of the following figures may be used in other figures described herein.

Various other objects and advantages reside in certain novel features of the arrangement and construction of parts as will be apparent from the following description taken in connection with the accompanying drawings in which,

Figure 1 is a diagram of a continuous absorption refrigerating system using inert gas and in which a rectifier constructed in accordance with the present invention is illustrated in cross section, this arrangement showing one embodiment of the invention.

Figure 2 is a diagram of a modified form of continuous absorption refrigerating systems and illustrating a further embodiment of the invention.

Figure 3 is a fragmentary, vertical cross sectional view of the rectifier of Figure 2 shown somewhat enlarged.

Figure 4 is a horizontal, cross sectional view of the rectifier shown in Figure 3, the view being taken on the line 4-4 thereof.

Figure 5 is a diagram of a continuous absorption refrigerating system illustrating still another embodiment of the present invention and showing the rectifier and a portion of the analyzer of the system in vertical cross section.

Figure 6 is an enlarged fragmentary view in cross section of the rectifier assembly shown in Figure 5.

Figure 7 is a horizontal cross-sectional view of the rectifier assembly of Figure 6 taken on the line 7-7 thereof.

Figure 8 is a diagram of a continuous absorption refrigerating system illustrating still another embodiment of the invention and showing a horizontal rectifier in vertical cross section.

Figure 9 is an enlarged fragmentary vertical cross sectional view of the rectifier assembly shown in Figure 8.

Figure 10 is a transverse cross sectional view of the rec-

tifier assembly shown in Figure 8, the view being taken on line 10-10 thereof, and

Figure 11 is a transverse cross sectional view of the rectifier of Figure 8, the view being taken on the line 11-11 thereof.

Referring to the drawings in detail, and first to the arrangement diagrammatically illustrated in Figure 1, it will be seen that a continuous absorption refrigerating system is there illustrated as consisting of a boiler B, a gas separation chamber S, the rectifier designated generally at R, a condenser C, an evaporator E and an absorber A, these vessels being connected by a number of conduits to form the complete refrigerating system.

In the arrangement of Figure 1, a gas lift pump 11 is employed for lifting absorption liquid from the boiler B into the gas separation chamber S. The refrigerant gas developed in the boiler system leaves the gas separation chamber S through the conduit 12 and enters the bottom of the rectifier proper. The rectifier consists of a vertically disposed cylinder 13 provided with a number of baffle plates 14 therein. The cylinder 13 is surrounded by an outer jacket 15 through which liquid may be circulated to remove heat from the interior of the cylinder 13 and from the baffle plates 14 therein to effect the rectification as will presently be described more in detail.

The refrigerant gas leaves the top of the rectifier 13 through the conduit 16 which conveys it to the condenser C. After the refrigerant condenses in the condenser, it flows into the evaporator through the conduit 17.

The evaporator E is connected to the absorber A by means of two inert gas conduits 18 and 19 which may be in heat exchange relation. The conduit 19 may connect the bottom of the evaporator to the top of the absorber and the conduit 18 may connect the top of the evaporator to the bottom of the absorber.

The conduit 18 may have an inert gas circulator mounted therein as shown at 20 and this circulator may be an ordinary centrifugal fan driven by a hermetically sealed electric motor 21.

A liquid conduit 22 connects the bottom of the gas separation chamber S to the top of the absorber. The bottom of the absorber is connected to the lower end of the jacket 15 on the rectifier by means of the liquid conduit 23. The top of the jacket 15 is connected to a reservoir 24 by means of a liquid conduit 25 and the bottom of the reservoir 24 is connected to the boiler B by means of the liquid conduit 26.

It will be apparent that with this arrangement of liquid conduits, liquid may flow by gravity from the gas separation chamber S through the conduit 22 into the top of the absorber and after trickling downwardly over baffle plates or the like within the absorber, flow by gravity through the conduit 23 upwardly through the jacket 15 and then downwardly through the liquid conduit 25 and the reservoir 24 back to the boiler through the conduit 26.

To prevent the accumulation of gas in the upper part of the jacket 15 a reversely bent pipe 27 may connect the top of the jacket to the refrigerant conduit 16.

The rectifier 13 must be provided with means for draining the liquid which collects therein. This is provided by the liquid drain conduit 28 connecting the lower portion of the conduit 12 to the reservoir 24.

It will be apparent from the above description that in the arrangement illustrated in Figure 1, the rectifier is located below the bottom of the absorber but above the normal level of the solution in the boiler B and in the reservoir 24. It will also be apparent that the strong aqua leaving the absorber through the conduit 23 is brought into heat exchange relation with the fluids in the rectifier 13 by means of the jacket 15. It will also be clear

that the pipes 23 and 22 may be in heat exchange relation and also that the pipe 26 which is connected to the bottom of the reservoir 24 may be in heat exchange relation with a portion of the pipe 22. The relative amounts of heat exchange area between the pipes 22 and 23 as compared with the amount of heat exchange area between the pipes 22 and 26 may be varied as desired to bring about the proper operation of the system.

The rectifier itself is essentially a heat exchanger and is part of the means for transferring heat from the fluids leaving the boiler to the strong aqua flowing to the boiler and it thus aids in the economy of heat.

While the arrangement illustrated in Figure 1 shows baffle plates within the rectifier cylinder 13, it is obvious that other filling material may be used.

The general features of the refrigerating system shown in Figure 1 are known to those skilled in the art and the operation of the system as a whole need not be described herein detail.

A modified form of the invention is shown in Figure 2 of the drawings. The general arrangement of the assembly may be the same as in Figure 1 and the parts which correspond are similarly designated. The rectifier assembly is combined with the reservoir into a single cylindrical arrangement, the rectifier 13 occupying the upper portion thereof and consisting of a cylindrical vessel placed within the outer casing 15. This is but a variation in details of construction from the arrangement shown in Figure 1. The reservoir 24 is vented through a conduit 29 which passes from the top of the reservoir to the conduit 16. Another vent conduit 30 connects the top of the jacket formed by the upper portion of the cylinder 15 to the upper end of the conduit 29.

An important feature of the arrangement of Figure 2 and one which differs from the arrangement of Figure 1,

results from the fact that the absorption liquid leaving the absorber A through the conduit 31 is divided into two streams by means of a solution divider 32. The solution divider may consist merely of a knife blade disposed below the lower end of the pipe 31. One stream of solution flows from the dividing chamber 32 through the horizontal pipe 33 into the top of the cylinder 15 around the rectifier. This stream is the only one which flows in heat exchange with the rectifier, the other stream passing downwardly through the conduit 34 and back to the boiler B. The stream of liquid which passes through the jacket formed by the cylinder 15 flows through the conduit 35 into the conduit 29 and from there into the reservoir 24 and drains back to the boiler through the conduit 36 connected to the conduit 34. The conduit 34 may be in heat exchange relation with the conduit 22 and the point of connection of the conduit 36 to the conduit 34 may be varied as desired to obtain the best operation of the system.

It will be apparent that the rectifier assembly of Figure 2 causes a transfer of heat to the strong aqua from the refrigerant gas flowing from the gas separation chamber through the conduit 12 to the conduit 16 in a way similar to that described above in connection with Figure 1. One difference is to be noted, however, and that is that in the arrangement of Figure 2 the absorption liquid flows downwardly through the jacket 15 whereas in Figure 1 it flows upwardly therethrough. The strong aqua thus flows in counterflow to the movement of vapors through the inner cylinder 13 of the rectifier.

In the arrangement of Figures 1 and 2 a gas lift pump is employed for circulating the absorption liquid. The present invention may be advantageously carried out where some motor or power driven liquid circulating means is employed and Figure 5 illustrates one way for accomplishing this. In this figure, the boiler B is shown pro-

vided with an analyzer chamber 37 which has a number of baffle plates therein as shown at 38. The top of the analyzer chamber is connected to the bottom of the rectifier cylinder 13 by means of a conduit 39. The gases pass upwardly through the rectifier cylinder 13 and flow through the conduit 16 into the condenser C as in the arrangement of Figure 1. The evaporator and absorber may be the same as described above in connection with Figure 1 and the parts which correspond are similarly designated. Absorption liquid is circulating between the boiler, the rectifier and the absorber by means of a liquid pump diagrammatically illustrated at 40 which is adapted to be driven by an electric motor 41. Liquid is supplied to the pump 40 through the conduit 42 from a reservoir 43. The liquid is then lifted through the discharge conduit 44 of the pump into the top of the absorber and it then flows by gravity down through the absorber, then through the conduit 45 into the top of the jacket 15 surrounding the rectifier cylinder 13. The bottom of the jacket 15 is connected to some convenient point in the analyzer 37 by means of the conduit 46. After trickling downwardly over the baffle plates 38 in the analyzer, the liquid flows through the boiler B and back to the reservoir 43 through the conduit 47. Both the conduits 45 and 46 may be in heat exchange relation with the conduit 47 as in the somewhat similar arrangement in Figure 1. The heat transfer area between these conduits may be varied as desired.

The jacket 15 may be vented into the conduit 16 by means of a pipe 27 and the rectifier chamber 13 may be drained into the conduit 46 by means of the small U pipe 48 connected to the lower end of the conduit 39.

The top of the reservoir 43 should be vented by means of a conduit 49 connected to the lower end of the inert gas conduit 18.

The operation of this system is similar to that described above in connection with Fig. 1, the only difference being in the means for circulating the absorption liquid.

In both of the arrangements of Figures 1 and 2, the jacket 15 surrounding the rectifier cylinder 13 is merely a plain cylinder and is maintained full of strong aqua. In the arrangement of Figure 5, on the other hand, the jacket 15 is provided with a number of baffle plates arranged in staggered relation, as best shown in Figure 6 and which are marked 50. The baffle plates 50 aid in causing the transfer of heat from the vapors in the rectifier cylinder 13 to the aqua solution in the jacket 15.

In the design of an absorption apparatus to include the special rectifier for permitting heat exchange between the hot vapors from the boiler and the strong aqua, the dimensions of the apparatus may be important if it is necessary to install the apparatus in a cabinet. In order to decrease the height to which the absorber must be elevated above the boiler to permit the use of the special heat exchange rectifier described above the use of a horizontal or slightly inclined rectifier may be employed and an arrangement of this sort is illustrated on the drawings in Figures 8 to 11, inclusive.

In the arrangement of Figure 8 a gas lift pump is employed for raising the absorption liquid as in the arrangement of Figure 1 and various other parts are the same as that in Figure 1 and are similarly designated.

A solution divider 32 is shown located below the absorber, as in the arrangement of Figure 2 and this element is similarly designated. Solution drains from the absorber through the conduit 31 into the solution divider 32 and some flows through the conduit 34 back to the boiler while others flow through the conduit 33 into the jacket 15 around the rectifier. The solution leaves the jacket 15 through the conduit 25 and flows into the reservoir 24 and from there

to the conduit 36 back to the boiler, the conduit 36 joining the conduit 34.

The rectifier shown in Figures 8, 9, 10 and 11 consists of a horizontal or slightly inclined cylinder 51 provided with a number of horizontally extending baffle plates 52. The baffle plates are preferably inclined in the same angle as the cylinder 51. The trays may be supported on and held in spaced relations by means of a number of substantially vertically extending baffle plates 53 arranged in staggered relation. The baffle plates which extend down to the bottom of the cylinder 51 may be provided with small openings 54 to allow the passage of liquid therethrough. With this construction gas enters the cylinder 51 through the conduit 12 and passes upwardly and then downwardly over the trays 52, as directed by the baffle plates 53 until it leaves the cylinder 51 through the conduit 16 at the left hand end thereof, as viewed in Figure 8.

The trays 52 which pass horizontally, or substantially horizontally, through the baffle plates 53 may have slots therein for permitting the liquid to flow along each tray but in the arrangement shown a substantially tight fit is illustrated so that the liquid which collects upon the trays as the result of the rectification (which may be called the reflux solution) drips from the upper trays on to the lower one in between each of the baffle plates 53 until it collects at the bottom of the vessel 51 and is drained through the holes 54 in the alternate baffle plates 53 and leaves the rectifier through the conduit 28 connected to the lower end of the vapor supply conduit 12.

It will be seen that with this construction a large area of contact for rectification is provided and at the same time a system for transferring heat to strong aqua is provided while utilizing a slight amount of vertical space.

From the above description, it will be clear that several different types of rectifiers adapted to be cooled by strong

aqua in accordance with the present invention have been illustrated and described. In all of these arrangements the rectifier is shown situated above the normal solution level in the boiler so that the rectifier can be drained by gravity flow into the boiler. It is of course within the purview of the invention to locate the rectifier partly, or entirely, below the normal solution level in the boiler and use a pump to pump the strong aqua from the level of the rectifier into the boiler.

It will also be apparent to those skilled in the art that while only a few embodiments of the invention have been illustrated and described herein, various changes may be made in the arrangement and construction of parts without departing from the spirit of the invention or the scope of the annexed claims.

I CLAIM:

1. In an absorption refrigerating system having a boiler, an absorber, means for circulating absorption liquid between the boiler and the absorber and a liquid heat exchanger, the combination of a rectifier and means for transferring heat from the rectifier to absorption liquid flowing from the absorber to the boiler, the arrangement being such that the absorption liquid flowing from the absorber to the boiler passes first in heat exchange relation with solution flowing from the boiler to the absorber, then in heat transfer relation with the rectifier and then again in heat exchange relation with absorption solution flowing from the boiler to the absorber.

2. In an absorption refrigerating system having a boiler, an absorber and means for circulating absorption liquid therebetween, the combination of a rectifier and means for transferring heat from the rectifier to absorption liquid flowing from the absorber to the boiler, the arrangement including a liquid divider for dividing the absorption liquid leaving the absorber into two streams,

one of which flows to the boiler and the other of which flows in heat transfer relation with the rectifier and then to the boiler.

3. In a continuous absorption refrigerating system having a boiler, an absorber and means for circulating absorption liquid therebetween, the combination of a rectifier and means for transferring heat from the rectifier to absorption liquid flowing from the absorber to the boiler, both said rectifier and said heat transfer means including baffling means positioned to cause the fluids within the rectifier and the absorption liquid to flow through tortuous passageways, the arrangement being such that the liquid leaving the absorber flows by gravity in heat transfer relation with the rectifier and then by gravity to the boiler.

4. A rectifier assembly adapted for use in an absorption refrigerating system, said assembly consisting of a cylindrical vessel disposed substantially in a horizontal position, a jacket surrounding said vessel, means for supplying vapors to the inner vessel and means for supplying liquid from a part of said refrigerating system to said jacket to take up heat from the vapors in said vessel, said vessel having a plurality of substantially horizontal trays therein and a plurality of substantially vertical baffle plates in spaced, staggered relation along said trays.

5. That improvement in an absorption refrigeration apparatus of the type having a boiler assembly, a condenser, an evaporator, and an absorber in circuit, and containing a refrigerant and an asorbent therefor, which comprises returning strong absorbent solution from the absorber to the boiler out of contact but in heat exchange relation with a mixture of hot refrigerant and absorbent vapor intermediate the boiler and condenser, whereby absorbent vapor is condensed and its heat of condensation is given up to said strong absorbent solution, and conducting refrigerant vapor liberated from said strong absorbent

solution as a result of said heat transfer to the condenser.

6. An absorption refrigeration system comprising a boiler, a condenser, an evaporator and an absorber connected in circuit, rectifying means in the circuit between the boiler and the condenser, means for returning at least part of the strong absorbent solution from the absorber to the boiler in heat exchange relation with said rectifying means, and means for venting said strong solution return means to a point intermediate the evaporator and the rectifying device.

7. That method of separating absorent vapor from refrigerant vapor produced in an absorption refrigeration apparatus which comprises passing said vapor mixture into heat exchange relation but out of contact with a strong solution of absorbent medium and refrigerant whereby the absorbent vapor is condensed and the heat of condensation is given up to the strong absorbent solution, and conducting any refrigerant vapor liberated from said strong absorbent solution into the refrigerant vapor from which the absorbent vapor has been removed.

8. An absorption refrigeration apparatus of the type comprising a boiler assembly, a rectifier assembly, a condenser, an evaporator, and an absorber in circuit, and containing a refrigerant, an absorbent therefor, said rectifier assembly comprising an elongated vessel positioned at an angle to the horizontal and having one end thereof connected to the condenser and the other end connected to said boiler assembly, means forming a passageway in heat exchange relation with said vessel, said passageway being connected between said absorber and said boiler assembly in such manner that at least a part of the strong absorbent solution flowing from the absorber to the boiler passes therethrough, and a refrigerant vapor passageway from an upper part of said passageway aforesaid and said connection between the condenser and said rectifier assembly.

9. That improvement in the art of rectification in absorption refrigeration apparatus of the type having a boiler assembly and an absorber connected in circuit, and containing a refrigerant in solution in an absorbent medium, comprising passing refrigerant and absorbent vapor liberated by the application of heat to the boiler assembly through a rectifier having a tortuous passageway formed by baffling means therewithin, condensing said absorbent vapor by passing a stream of liquid at a lower temperature than said vapor in heat exchange relation but out of contact with said vapor in said rectifier, and subsequently returning the liquid heated by the heat of condensation of said absorbent vapor to the boiler assembly, and simultaneously conducting lean absorbent medium from said boiler to said absorber independently of said rectifier.

10. That method of producing refrigeration by means of an absorption refrigeration apparatus of the type having a boiler, a rectifier, a condenser, an evaporator, and an absorber connected in circuit and containing a refrigerant, an absorbent therefor and a pressure equalizing medium, which method consists in liberating refrigerant vapor from the absorbent by the application of heat, condensing said vapor, evaporating the condensate so formed into the pressure equalizing medium to produce refrigeration, conducting weak absorbent and the mixture of refrigerant vapor and pressure equalizing medium into intimate contact whereby the weak absorbent is enriched by refrigerant, returning the pressure equalizing medium into the presence of more condensate, which method is characterized by the fact that at least a part of the enriched absorbent is returned to the heating zone after first passing in heat exchange relation but out of contact with freshly liberated hot refrigerant whereby absorbent vapor contained therein is condensed and the heat of condensa-

tion serves to preheat said enriched absorbent, and conducting refrigerant vapor liberated therefrom by reason of said preheating to the main stream of refrigerant vapor.

11. That method of producing refrigeration by means of an absorption refrigeration system having a boiler, rectifier, condenser, evaporator and absorber connected in circuit and containing a refrigerant, an absorbent medium therefor, and an inert gas, which method includes generating refrigerant vapor from rich solution in a generating zone, passing lean solution directly to an absorption zone independently of an absorption vapor rectifying zone, and returning enriched absorption solution to said generating zone after passing the same in heat exchange relation but out of contact with the vapors emanating from said generating zone to condense absorption medium vapor from said vapors and to preheat said enriched solution.

12. In an absorption refrigerating system, a generator, a rectifier, an absorber, and a vapor liquid lift for causing circulation of absorption liquid between said generator and absorber, said rectifier being arranged for cooling thereof by absorption liquid flowing toward said generator, and said lift being connected to said absorber and said rectifier and said generator to receive liquid from both said absorber and rectifier and vapor from said generator.

13. In an absorption refrigerating system, a generator, a rectifier, a absorber, and a vapor liquid lift for causing circulation of absorption liquid between said generator and said absorber, said rectifier being arranged for cooling thereof by absorption liquid flowing toward said generator, and means for connecting said lift absorber, rectifier and generator so that said lift receives liquid from both said absorber and rectifier and vapor from said generator.

14. In an absorption refrigerating system, a generator, a rectifier, an absorber, a liquid heat exchanger connected between said generator and absorber, said rectifier being

in heat transfer relation with said exchanger, and a vapor liquid lift for causing circulation of absorption liquid between said generator and absorber through said exchanger, said lift being connected to receive liquid from both absorber and rectifier and vapor from said generator.

15. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

16. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and a heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

17. An absorption refrigerating system as set forth in claim 15 in which vapors conducted from the generator to the heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

18. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and a heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface level of liquid in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit, said connection for flowing vapors from said generator to said heat exchanger being so related to said connection for flowing liquid to said generator that vapors flowing from said generator to said heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

19. In an absorption refrigerating apparatus, a generator including a vapor liquid lift, an absorber, a heat exchanging device, means for conducting weak absorption liquid from said generator to said absorber, means for conducting a portion of the strong absorption liquid from the absorber to said lift in heat exchange relation with said weak liquid, means for conducting another portion of said strong absorption liquid from the absorber to said heat exchanging device, means for conducting the liquid from the heat exchanging device to said lift and means for conducting vapor from said generator to the heat exchanging device.

20. In an absorption refrigerating apparatus, an absorber having a liquid sump, a generator having a vapor liquid lift chamber located below the liquid level in said sump, a heat exchanging device below said level and above said chamber, means for conducting weak absorption liquid

from said generator to said absorber, means for conducting a portion of the strong absorption liquid from said sump to the generator in heat exchange relation with said weak liquid, means for conducting another portion of said strong absorption liquid from said sump by gravity flow to said heat exchanging device, means for conducting liquid from said heat exchanging device to said lift chamber by gravity flow and means for conducting vapor from said generator to said heat exchanging device.

21. That improvement in the art of refrigeration which includes absorbing refrigerant vapor in an absorption liquid to form a strong solution, flowing a portion of said strong solution to a region of high temperature to evaporate refrigerant vapor therefrom and to form a weak solution, passing said vapor in heat exchange relation with another portion of strong solution, transferring heat from said weak solution to the first mentioned portion of said strong solution, uniting said portions to form a single stream and elevating said stream by the application of heat thereto.

22. An absorption refrigerating system including a generator, a rectifier for vapor from said generator connected to said generator and arranged to be cooled by absorption liquid flowing to said generator, and an analyzer in which the vapors from said generator flow and contact with absorption liquid flowing to said generator and which is connected to the rectifier to receive condensate from said rectifier.

23. An absorption refrigerating apparatus comprising, an absorber, a generator-vapor lift assembly, a condenser, a triple pass heat exchanger having the passes thereof sealed from one another, means for conducting vapor from said generator-vapor lift assembly through one pass of said heat exchanger to said condenser, an absorption liquid circuit including means for conducting weak absorp-

tion liquid from said generator-vapor lift assembly through a second pass of said heat exchanger to said absorber and means for conducting strong absorption liquid from said absorber through the third pass of said heat exchanger to said generator-vapor lift assembly, said exchanger being located at a level below the surface level of liquid in both said generator-vapor lift assembly and said absorber, said circuit including means between said heat exchanger and said generator-vapor lift assembly for creating a third surface level below a portion of said heat exchanger for permitting drainage of condensate from the vapor pass of said heat exchanger to said circuit.

24. An absorption refrigerating apparatus comprising, an absorber, a generator-vapor lift assembly, a condenser, a triple pass heat exchanger having the passes thereof sealed from one another, means for conducting vapor from said generator-vapor lift assembly through one pass of said heat exchanger to said condenser, an absorption liquid circuit including means for conducting weak absorption liquid from said generator-vapor lift assembly through a second pass of said heat exchanger to said absorber and means for conducting strong absorption liquid from said absorber through the third pass of said heat exchanger to said generator-vapor lift assembly, said exchanger being located at a level below the surface level of liquid in both said generator-vapor lift assembly and said absorber, said circuit including means between said heat exchanger and said generator-vapor lift assembly, for creating a third surface level below a portion of said heat exchanger for permitting drainage of condensate from the vapor pass of said heat exchanger to said circuit, and said means for conducting vapor to said heat exchanger being so related to said means for conducting strong absorption liquid to said generator-vapor lift assembly, that

vapors flowing to said heat exchanger come into physical contact with rich solution flowing to said generator-vapor lift assembly.

25. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, a solution circuit for conducting weak solution from said generator to said absorber and strong solution from said absorber to said generator, vapor lift means for circulating said solution in said circuit, conduit means for conducting vapor from said generator to said condenser, said solution circuit including means to conduct a portion of said strong solution into heat exchange with vapor flowing from said generator to said condenser and another portion of said strong solution into heat exchange with weak solution leaving the boiler.

26. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, a solution circuit for conducting weak solution from said generator to said absorber and strong solution from said absorber to said generator, vapor lift means for circulating said solution in said circuit, conduit means for conducting vapor from said generator to said condenser including a rectifier in heat exchange relation with strong solution flowing to said generator.

27. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, a solution circuit for conducting weak solution from said generator to said absorber and strong solution from said absorber to said generator, vapor lift means for circulating said solution in said circuit, conduit means for conducting vapor from said generator to said condenser including a rectifier in heat exchange with strong solution flowing to said generator and means for bringing vapor flowing from said generator into contact with strong solution flowing to said generator.

28. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, a solution circuit for conducting weak solution from said generator to said absorber and strong solution from said absorber to said generator, vapor lift means for circulating said solution in said circuit, conduit means for conducting vapor from said generator to said condenser including a rectifier in heat exchange with strong solution flowing to said generator, means for conducting condensate from said rectifier to said circuit and vapor from said strong solution circuit to said conduit means leading to the condenser.

29. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak solution from said generator to said absorber, conduit means for vapor from said generator to said condenser including a rectifier, and means for flowing strong solution from said absorber to said generator, said last mentioned means including means for bringing said strong solution into heat exchange with said rectifier and into contact with vapor in said vapor conduit means.

30. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak solution from said generator to said absorber, a vapor conduit from said generator to said condenser including a rectifier, conduit means for flowing strong solution from said absorber to said generator, said conduit means including a heat exchanger for exchange of heat between said strong solution and vapor in said rectifier and means for conducting vapor generated from said strong solution in said exchanger to said vapor conduit and condensate from said rectifier to said conduit means.

31. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak solution from said generator to said absorber, means for

conducting vapor from said generator to said condenser including a rectifier, conduit means for flowing strong solution from said absorber into heat exchange with said rectifier and to said generator and means for flowing liquid from said rectifier into said conduit means.

32. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak absorption liquid from said generator to said absorber, a vapor conduit from said generator to said condenser including a rectifier, means for flowing strong absorption liquid from said absorber to said generator, said last mentioned means including a heat exchanger for exchange of heat between said strong absorption liquid and vapor in said rectifier and means for leading vapor generated from said strong solution in heat exchange with said rectifier, to said vapor conduit.

33. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak solution from said generator to said absorber, conduit means for vapor from said generator to said condenser including a rectifier positioned below the normal liquid level in the absorber, means for flowing strong solution from said absorber into heat exchange with said rectifier by gravity and means for flowing liquid condensed in said rectifier and strong solution from the heat exchanger to said generator by gravity.

34. In an absorption refrigerating apparatus, a generator, a condenser, an absorber, means for flowing weak solution from said generator to said absorber, conduit means for vapor from said generator to said condenser including a rectifier, positioned below the liquid level in said absorber, means for flowing strong solution from said absorber into heat exchange with said rectifier by gravity and means for flowing liquid condensed in said rectifier

and strong solution from the heat exchanger, by gravity to said generator, said last mentioned means including means for bringing said liquid and strong solution into contact with vapor leaving the generator.

35. That method of separating absorbent vapor from refrigerant vapor produced in an absorption refrigeration apparatus which comprises passing said vapor mixture into heat exchange relation but out of contact with a strong solution of absorbent medium and refrigerant whereby the absorbent vapor is condensed and the heat of condensation is given up to the strong absorbent solution, conducting any refrigerant vapor liberated from said strong absorbent solution into the refrigerant vapor from which the absorbent vapor has been removed and conducting absorbent vapor condensed from said vapor mixture into the strong absorbent solution.

36. An absorption refrigeration system including a condenser, an evaporator, an absorber, a generator including a heated chamber, a rising conduit having its lower end extending into said heated chamber and forming a vapor lift by which vapor formed by heating of liquid in said chamber raises liquid to a level from which it flows by gravity to said absorber, a rectifier for vapor flowing from said generator to said condenser and located at a level below the surface level of liquid in said absorber, and conduits interconnecting said absorber and generator and also connecting said rectifier to said generator so that liquid flows by gravity from both said absorber and said rectifier to said generator.

37. In an absorption refrigerating system, a generator, a rectifier, an absorber, heat exchange means connected between said generator and absorber, said rectifier being in heat exchange relation with said heat exchange means, and a vapor liquid lift for causing circulation of absorp-

tion liquid between said generator and absorber through said heat exchange means, said lift being connected to receive liquid from both absorber and rectifier and vapor from said generator.

38. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a three-part heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

39. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and heat exchange means, said exchange means being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchange means also being located at a level below the surface level of liquid in both said generator-vapor lift assembly, and said absorber, and means for creating a third surface level of liquid in said circuit below a vapor portion of said heat exchange means to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit.

40. An absorption refrigerating system as set forth in Claim 38 in which vapors conducted from the generator to the heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

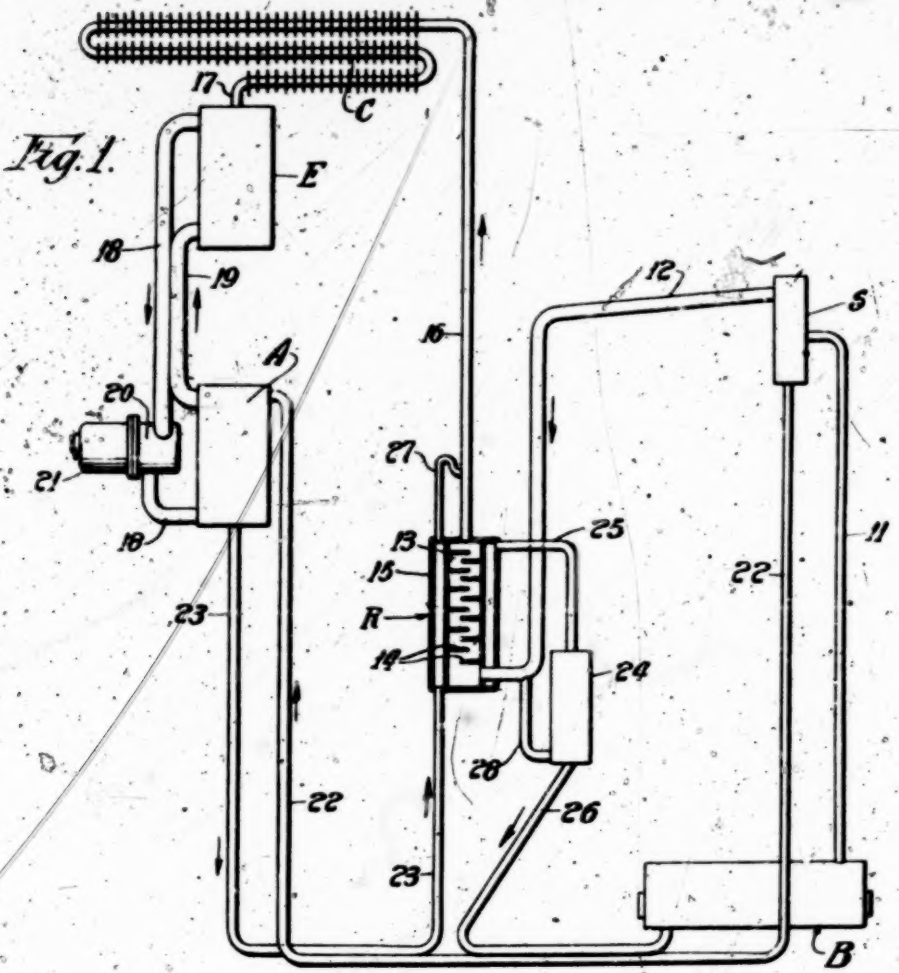
41. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and heat exchange means, said exchange means being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchange means also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said exchange means to permit drainage of condensate from the vapor portion of said exchange means into said liquid circuit, said connection for flowing vapors from said generator to said heat exchange means being so related to said connection for flowing liquid to said generator that vapors flowing from said generator to said exchange means pass in physical contact with absorption liquid flowing from said heat exchange means to said generator.

Nov. 7, 1939. C. C. COONS 2,178,870

CONTINUOUS ABSORPTION REFRIGERATING SYSTEM

Filed Aug. 8, 1936 4 Sheets-Sheet 1

Fig. 1.



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Nov. 7, 1939. C. C. COONS 2,178,870

CONTINUOUS ABSORPTION REFRIGERATING SYSTEM

Filed Aug. 8, 1936 4 Sheets-Sheet 2

Fig. 2.

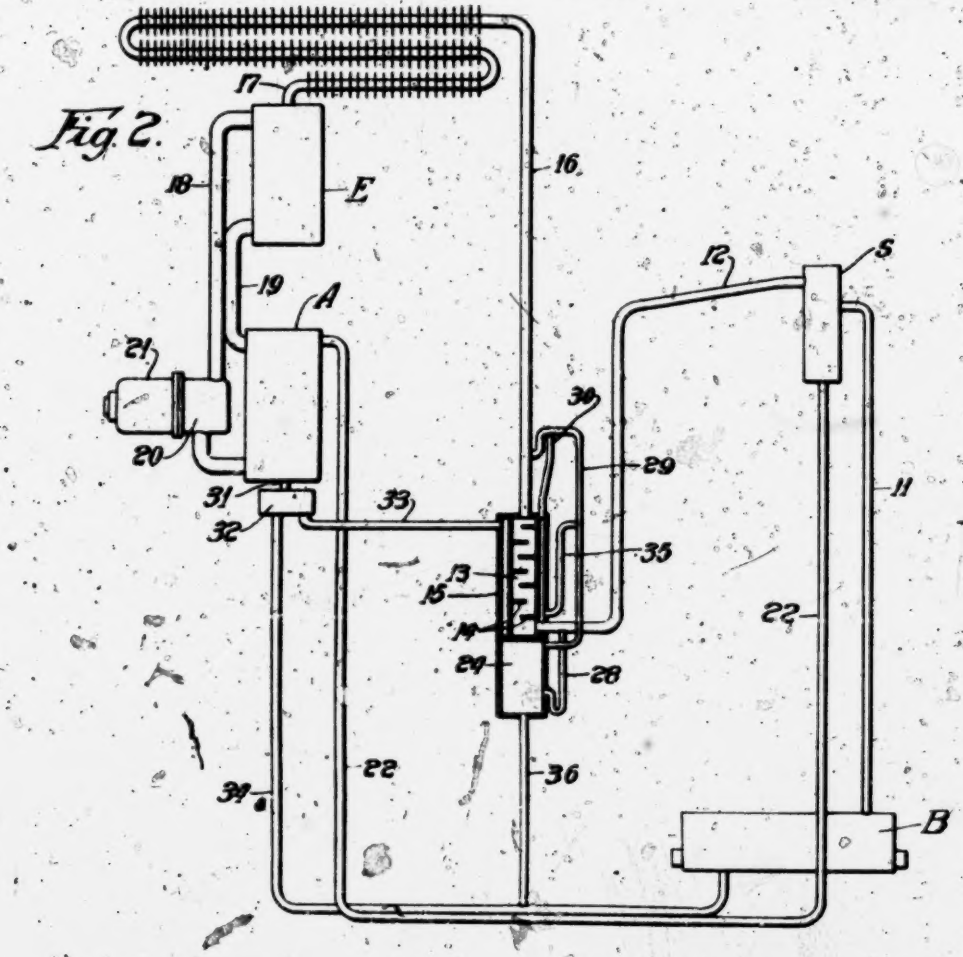


Fig. 3.

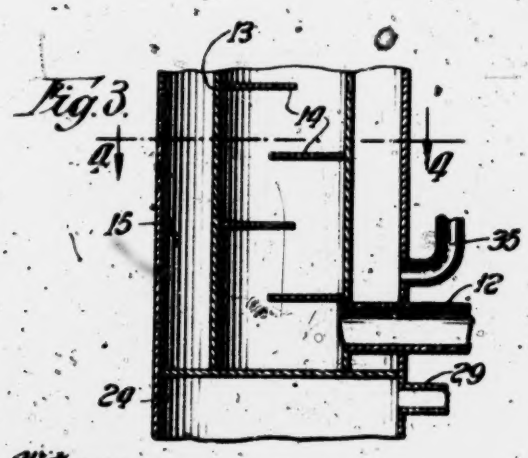
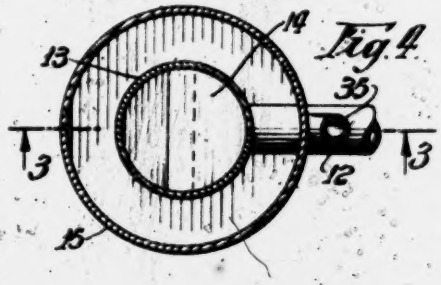


Fig. 4.



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Nov. 7, 1939. C. C. COONS 2,178,870

CONTINUOUS ABSORPTION REFRIGERATING SYSTEM

Filed Aug. 8, 1936 4 Sheets-Sheet 3

Fig. 5.

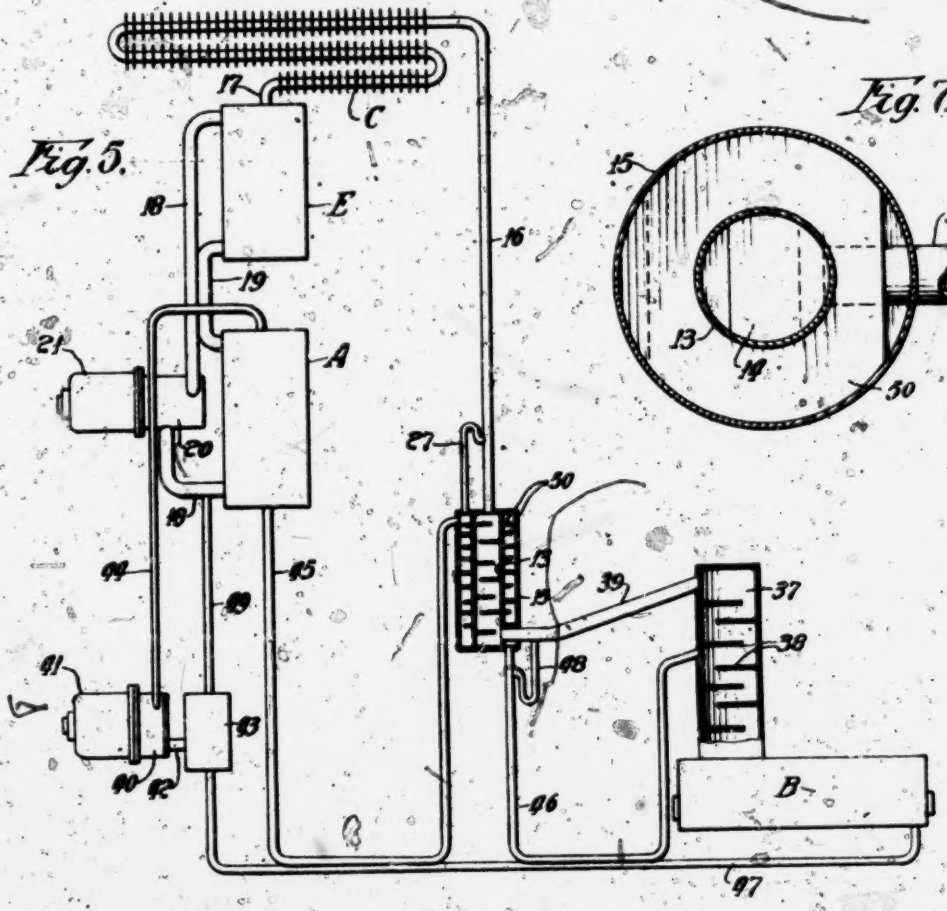
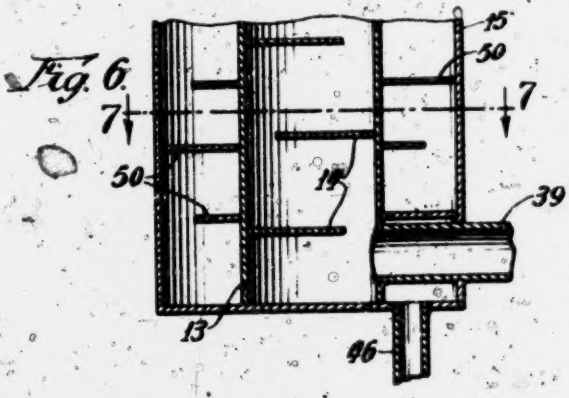


Fig. 7.

Fig. 6.



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Nov. 7, 1939. C. C. COONS 2,178,870

CONTINUOUS ABSORPTION REFRIGERATING SYSTEM

Filed Aug. 8, 1936 4 Sheets-Sheet 4

Fig. 8.

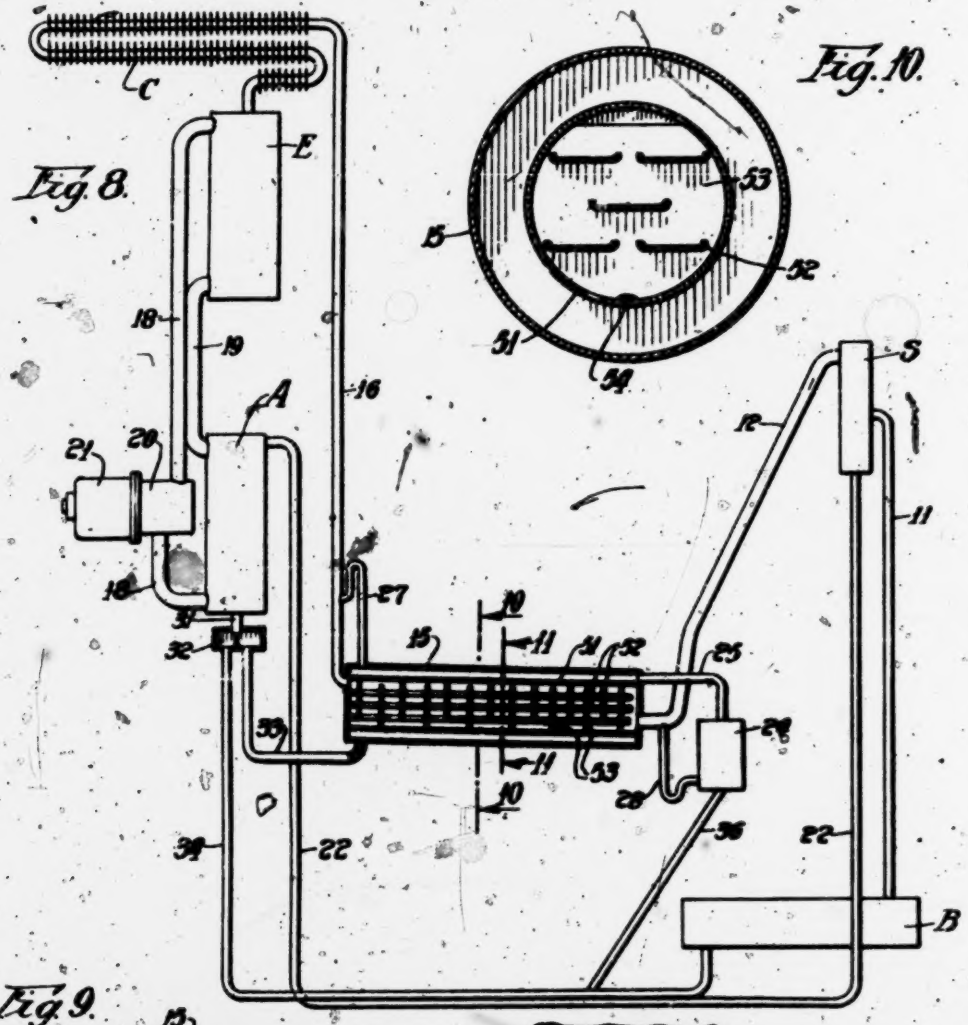

Fig. 10.

Fig. 9.

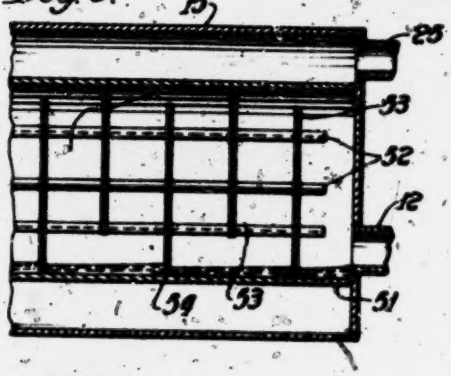

Fig. 11.

Witness.
E. Campeini

Inventor:
Curtis C. Coons,
By: Harry S. Druare
Attorney.

Div. 44 Room 4087B Paper No. 4

DEPARTMENT OF COMMERCE

United States Patent Office

WASHINGTON

K:mb

Conway P. Coe
Commissioner of Patents

Harry S. Demaree
2300 Willoughby Tower
Chicago, Ill.

Applicant: Curtis C. Coons
Ser. No. 373,970
Filed Jan. 10, 1941
For Continuous Absorption Refrigerating System

Mailed
Mar. 28, 1941

Responsive to amendment filed Feb. 24, 1941.

Claim 14 has been reconsidered but is again rejected as not reading on applicant's disclosure for reasons pointed out in detail in the last preceding Office action. In applicant's disclosure the heat exchangers 22-23 and 22-26 are no more in heat transfer relation with the rectifier R than is the boiler B or the evaporator E. In other words the phrase "in heat transfer relation" is meaningless as applicant endeavors to apply it to his disclosure.

Claims 15, 16, 17 and 18 have been reconsidered but are also again rejected as not reading on applicant's disclosure for reasons pointed out in detail in the last preceding Office action.

New claim 36, which is claim 3 of the patent to Anderson No. 2,203,074, June 4, 1940 (Filed Dec. 31, 1937), and which was copied from said patent for the purpose of interference, appears to be patentable and readable upon this application, therefore an interference will be declared promptly between this application and the Anderson patent.

New claim 37 which is based on claim 3 of the patent to Ullstrand 2,215,674 is rejected as not reading on applicant's disclosure for much the same reason as claim 14, above. Applicant's disclosure does not support the phrase, "said rectifier being in heat exchange relation with said heat exchange means", as called for in this claim.

New claims 38, 39, 40 and 41, which are similar to claims 15 to 18 inclusive, and which in turn are based upon claims 7 and 8 of the patent to Bergholm No. 2,201,361, are rejected as not reading on applicant's disclosure for much the same reasons as claims 15 to 18 inclusive.

Applicant does not disclose a "three-part heat exchanger", as called for in claims 38 and 40, any more than does he disclose "a triple heat exchanger" as called for in claim 15. Also applicant does not disclose a three part heat exchanger "located at a level below the surface levels of liquid in both said generator and said absorber," as called for in claims 38 and 40.

Applicant does not disclose "heat exchange means being connected to conduit vapors and liquids from the generator . . . said exchange means being also located at a level below the surface level of liquids in both said generator vapor lift assembly and said absorber," as called for in claims 39 and 41. Also "the surface level" in "the generator-vapor lift assembly" is meaningless as applied to applicant's disclosure; the surface of the liquid in applicant's generator B is at one level, while that in his separator S is at a different level.

SUMMARY

Claims 1-8 inclusive, 10, 11 and 34 appear at present to be allowable.

Claim 12, which is claim 1 of the patent to Ullstrand No. 2,215,674, and which was copied from said patent ap-

pears to be patentable and readable upon this application and an interference is being declared between this application and the Ullstrand patent.

Claim 13, which is modified claim 1 of the Ullstrand patent appears to be patentable and readable upon this application. However as previously stated, this claim is deemed to be unwarranted for interference purpose.

Claims 14 and 37 which have been copied and substantially copied, respectively, from the Ullstrand patent are rejected as not reading on applicant's disclosure. If applicant desires to further contest priority as to these two claims his remedy is by a proper motion under Rule 109 during the motion period of the interference that is being declared between this application and the Ullstrand patent.

Claims 15, 16, 17, 18, 38, 39, 40 and 41, which have been copied or substantially copied from the patent to Bergholm No. 2,201,362 are rejected as not reading on applicant's disclosure and this rejection is Made Final.

Claims 19, 20 and 21, which are based upon claims 1, 2 and 4, respectively, of the patent to Taylor No. 2,222,548 appear to be patentable and readable upon this application, but as stated in the last preceding Office action, these claims do not come within the doctrine of Ex parte Card and Card, therefore an interference between this application and the Taylor patent is unwarranted.

Claims 9, 22-23 inclusive and 35 stand rejected as of the Office action of February 4, 1941.

If applicant desires to further contest priority as to claims 15, 16, 17, 18, 38, 39, 40 and 41 he is required, under the provisions of Rule 63, to appeal to the Board of Appeals from the final rejection of these claims on or before April 25, 1941. Failure to appeal within the time fixed will be deemed a disclaimer of the invention claimed.

Examiner.

IN THE UNITED STATES PATENT OFFICE,

Before the Board of Appeals.

Application of:
Curtis C. Coons
Serial No. 373,970
Filed: January 10, 1941
For: Continuous Absorption Refrigerating System

Div. 44
Room 4087B
April 24, 1941

NOTICE OF APPEAL.

Hon. Commissioner of Patents
Washington, D. C.
Sir:—

The applicant hereby appeals to the Board of Appeals from the Examiner's final rejection of Claims 15, 16, 17, 18, 38, 39, 40 and 41 on the following grounds:

1. The Examiner erred in finally rejecting Claims 15, 16, 17, 18, 38, 39, 40 and 41.
2. The Examiner erred in finally rejecting Claims 15, 16, 17, 18, 38, 39, 40 and 41 as not reading on applicant's disclosure.

The appeal fee of $15.00 is forwarded herewith.

Respectfully,
CURTIS C. COONS,

By .....
Attorney.

RRF:hks
AIRMAIL

DEPARTMENT OF COMMERCE

UNITED STATES PATENT OFFICE

WASHINGTON

Mailed
July 12, 1941

In re application of
Curtis C. Coons
Serial No. 373,970
Filed: Jan. 10, 1941
For: Continuous Absorption Refrigerating System

On Appeal to the Board of Appeals

EXAMINER'S STATEMENT.

This is an appeal from the action of the Primary Examiner in finally rejecting claims 15, 16, 17, 18, 38, 39, 40, and 41.

Claim 15 is claim 7 of the patent to Bergholm No. 2,201,362, May 21, 1940, and has been copied into this reissue application for the purpose of interference.

Claims 16, 17, 18, 38, 39, 40 and 41 are based on claims 7 and 8 of said Bergholm patent, and have been inserted into this application for the purpose of interference under the doctrine of Ex parte Card and Card (1120 O. G. 499; 1904 C. D. 383).

The appealed claims have all been finally rejected for the reason that they are not supported by applicant's disclosure.

The appealed claims read as follows:

Claim 15. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the

generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

Claim 16. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and a heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

Claim 17. An absorption refrigerating system as set forth in the preceding claim in which vapors conducted from the generator to the heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

Claim 18. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and a heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface level of liquid in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into

said liquid circuit, said connection for flowing vapors from said generator to said heat exchanger being so related to said connection for flowing liquids to said generator that vapors flowing from said generator to said heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

Claim 38. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a three-part heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

Claim 39. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and heat exchange means, said exchange means being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchange means also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a vapor portion of said heat exchange means to permit drainage of condensate from the vapor portion of said heat exchange means into said liquid circuit.

Claim 40. An absorption refrigerating system as set forth in Claim 38 in which vapors conducted from the generator to the heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

Claim 41. An absorption refrigerating system having a circuit for absorption liquid including a generator-vapor lift assembly, an absorber, and heat exchange means, said exchange means being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchange means also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber, and means for creating a third surface level of liquid in said circuit below a portion of said exchange means to permit drainage of condensate from the vapor portion of said exchange means into said liquid circuit, said connection for flowing vapors from said generator to said heat exchange means being so related to said connection for flowing liquid to said generator that vapors flowing from said generator to said exchange means pass in physical contact with absorption liquid flowing from said heat exchange means to said generator.

The invention pertains to a heat operated absorption refrigerating apparatus of the type having an inert gas in the system into which the refrigerant diffuses in the evaporator to produce cooling.

Applicant's Disclosure.

In so far as the appealed claims are concerned, a description of the refrigerating system illustrated in Fig. 1 is believed to be sufficient. In this figure an absorption refrigerating system is disclosed wherein heat is supplied to the boiler B to drive refrigerant vapor out of a saturated solution of ammonia and water, commonly referred to as strong aqua. Ammonia vapor boils off from the water and in passing through the vapor lift pump 11 carries slugs of weakened absorption solution (weak aqua) into the separating chamber S. From the separating

chamber the ammonia vapor passes through conduit 12, rectifier R, conduit 16 to condenser C. In condenser C the ammonia vapor condenses to liquid. The liquid ammonia flows through conduit 17 into evaporator E. In evaporator E, the liquid ammonia evaporates by diffusing through an inert gas such as nitrogen and this evaporation produces the desired cooling. The mixture of ammonia and nitrogen gas formed in the evaporator passes through conduit 18 and gas circulator 20 into the lower end of absorber A. Weak aqua passes from gas separator S through conduit 22 into the upper end of absorber A. In passing through the absorber the weak aqua absorbs the ammonia from the mixture of ammonia and nitrogen. The strong aqua formed by this absorption flows from the bottom of the absorber through conduit 23, rectifier R, conduit 25, reservoir 24 and conduit 26 back to boiler B where the ammonia is again boiled off. The nitrogen is not absorbed by the weak aqua in the absorber and returns through conduit 19 the bottom of evaporator E to cause more diffusion and evaporation of ammonia in the evaporator. The strong aqua in passing from the absorber to the boiler is conducted in heat exchange relation with the weak aqua passing from the gas separator S to the absorber in two places, one where conduits 23 and 22 are in heat exchange relation, and another where the conduits 26 and 22 are in heat exchange relation. The strong aqua also passes in heat exchange relation with the ammonia vapor as the former passes through the outer chamber 15 of the rectifier R and the later passes through the inner chamber 13 of said rectifier. In other words, the application discloses three separate and distinct heat exchangers.

Bergholm Patent Disclosure.

The Bergholm patent, from which the appealed claims were copied or substantially copied by applicant for the purpose of interference, discloses a refrigerating system of the absorption type containing a refrigerant fluid such as ammonia, an absorption liquid for the refrigerant such as water, and an inert pressure equalizing gas such as hydrogen. Figure 1 of this patent illustrates such a refrigerating system wherein ammonia vapor, expelled from solution by heating generator 10, flows through conduit 31, vessel 28, conduit 27 outside passage 25 of triple heat exchanger 22, and conduit 26 to condenser 18. Ammonia vapor is condensed to liquid in the condenser and the liquid flows through conduit 20 into the upper end of evaporator 16. Liquid ammonia flows downward in evaporator 16 and evaporates and diffuses into hydrogen which flows upward in the evaporator, producing a refrigerating effect. The mixture of ammonia vapor and inert gas flows by gravity from the upper end of the evaporator through the inner passage of gas heat exchanger 21, into the lower end of the absorber.

Weakened absorption liquid flows by gravity from the lower part of generator 10 through conduit 34, inner passage 23 of triple heat exchanger 22, and conduit 35 into the upper part of absorber 13. Absorption liquid flows downward in the absorber and absorbs ammonia vapor out of the mixture of ammonia vapor and inert gas from the evaporator which flows upwards through the absorber. Enriched absorption solution flows from the lower end of absorber 13 into vessel 14. From vessel 14 the enriched absorption solution flows through conduit 32, the middle passage 24 of the triple heat exchanger 22, conduit 33, and conduit 31 into reservoir 28. From reservoir 28 the enriched absorption solution flows through

conduit 29 and vapor-lift pump 30 back to the top of generator 19, where the solution is again heated to expel the ammonia vapor therefrom.

The "triple heat exchanger" 22 of this patent is so constructed and arranged that the refrigerant vapor in passing from the generator to the condenser passes in heat exchange relation with the enriched absorption solution passing from the absorber to the generator, and the said enriched absorption solution is simultaneously in heat exchange relation with weak absorption solution passing from the generator to the absorber. In other words, this patent discloses a single heat exchanger wherein three fluids are brought into heat exchange relation.

Claim 15, which is a verbatim copy of claim 7 of the patent to Bergholm, stands finally rejected as not being supported by applicant's disclosure. This claim includes:

> "* * * a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquids in said circuit below said heat exchanger * * *".

In this instant application, as stated above, there is disclosed three separate and distinct heat exchangers, and not "a triple" heat exchanger as called for in claim 15. Also one of the heat exchangers, the rectifier R, is above the surface level of liquid in the generator B and not "below" the surface levels in both said generator and said absorber. Furthermore, the reservoir 24, which is

the only element that may be said to be a "means for creating a third surface level", is above the two heat exchangers 23-22 and 26-22 and not "below said exchanger.", as called for in this claim.

Claim 16, which may be taken as representative of finally rejected claims 16, 17, 18, 39, 40 and 41 includes:

> "* * * a heat exchanger, said exchanger being connected to conduct vapors and liquids from the generator and liquids flowing to the generator * * *, said exchanger also being located at a level below the surface level of liquids in both said generator-vapor lift assembly and said absorber * * *."

Applicant discloses three heat exchangers and not "a" heat exchanger arranged in the manner called for in claim 16. Also the phrase "surface level" is meaningless when applied to applicant's so called "generator-vapor lift assembly". In applicant's generator (boiler B) the surface level of liquid is somewhere in the vicinity of the connection between the boiler B and the vapor lift pump 11, depending on the type of vapor lift pump that is used, and in applicant's gas separator S, which he includes as a part of the generator-vapor lift assembly, the surface level is somewhere below the connection between the vapor lift pump 11 and said gas separator S. In other words, there are two surface levels in applicant's generator-vapor lift assembly and not a surface level as required by claim 16.

Claim 38, which is a duplicate of claim 15, except that claim 15 recites "a triple heat exchanger", and claim 38 calls for "a three-part heat exchanger", stands finally rejected for the same reasons as claim 15. Applicant does not disclose a three-part heat exchanger any more than he does a triple heat exchanger. Also the other criticism

applied to claim 15, above, applies in the same manner to claim 38.

Conclusions.

None of appealed claims 15, 16, 17, 18, 38, 39, 40 or 41 read on applicant's disclosure. It is submitted, therefore that these claims stand properly rejected.

Respectfully submitted,

Examiner, Division 44.

DEPARTMENT OF COMMERCE

UNITED STATES PATENT OFFICE

WASHINGTON

Mailed
Sep 9 1941

In re application of
Curtis C. Coons
Serial No. 373,970
Filed: Jan. 10, 1941
For: Continuous Absorption Refrigerating System

On Appeal to the Board of Appeals

SUPPLEMENTAL EXAMINER'S STATEMENT.

This case has been remanded to the Primary Examiner for his disposition of the communication filed by applicant July 16, 1941, wherein applicant requested the Examiner to indicate on record that the affidavit of applicant and the amendment filed April 23, 1941 were considered by the Examiner.

The Examiner's Statement does not specifically state that the above affidavit and amendment were considered by the Examiner. However, both the affidavit and the amendment were carefully considered by the Examiner at the time the Examiner's Statement was written.

To amplify the Examiner's Statement, as to applicant's affidavit, the Examiner does not consider that this affidavit adds anything to the case insofar as the rejection of the appealed claims is concerned. As a matter of fact, applicant in his affidavit more or less admits that there are two surface levels in his so called "generator-vapor lift assembly", and not a surface level in the generator as required by appealed claim 16, for instance. In page 2, lines 12 to 17 inclusive of applicant's affidavit the following statement is found:

> "... there is no definite liquid level maintained in the boiler B per se but that the liquid in the boiler B rises in the conduit 11 so as to maintain a definite depth of immersion on the vapor lift 11. That the level of liquid in the vessel 24 is below the liquid level in the gas separation chamber S and also below the liquid level in the absorber A".

In other words, there is one liquid level in the vicinity of the connection between the boiler B and the vapor lift conduit 11, and another liquid level in the separator chamber S.

Furthermore, the last phrase of the above quotation, "and also below the liquid level in the absorber A", is not supported by applicant's original disclosure. In none of the systems disclosed by applicant is there a liquid level in the absorber. While applicant has not disclosed any particular type of absorber, he states in page 2, column 2, lines 43-48 inclusive of his specification:

> "... liquid may flow ... through the conduit 22 into the top of the absorber and after trickling downwardly over baffle plates or the like within the absorber, flow by gravity through the conduit 23...."

Since the conduit 23 is connected to the bottom of the absorber and the rich gas conduit 18 leads into the bottom of the absorber it is not seen how it may be said that there is a "liquid level in the absorber".

In the Bergholm patent from which the appealed claims were copied, or substantially copied, for the purpose of interference, a liquid level is clearly shown in the sump portion 14 of the absorber. That the sump 14 is a part of Bergholm's absorber is clear from the following statement found in page 1, column 1, lines 15-17 of his specification:

"An absorber comprises a conduit 13 and a liquid accumulation vessel or sump 14."

As to the amendment of April 23, 1941, referred to by applicant in his communication of July 16, 1941, this amendment had been entered and was obviously a part of the case when the Examiner's Statement was written.

It is submitted that the appealed claims stand properly rejected for reasons pointed out in the Examiner's State ment of July 12, 1941, and amplified in this Supplemental Examiner's Statement.

Respectfully submitted,

Examiner, Division 44.

Appeal No. 39,111
Hearing:
September 25, 1941

IN THE UNITED STATES PATENT OFFICE

Before the Board of Appeals.

Ex parte Curtis C. Coons.

Application for patent filed January 10, 1941, Serial No. 373,970, for the reissue of patent No. 2,178,870 granted November 7, 1939. Continuous Absorption Refrigerating System.

Mr. Harry S. Demaree and Mr. Richard R. Fitzsimmons for applicant.

This is an appeal from the decision of the examiner finally rejecting claims 15 to 18 and 38 to 41. In the brief filed notice is given that the appeal is withdrawn as to claims 17, 18, 40 and 41 leaving only claims 15, 16, 38 and 39 for our consideration.

The following claim is representative:

> 15. An absorption refrigerating system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level

below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

Claim 15 was copied from the patent to Bergholm No. 2,201,362 May 21, 1940 for the purpose of interference. The remaining claims are based on claims 7 and 8 of said Bergholm patent and have been inserted here for the purpose of interference under the practice set forth in *Ex parte* Card and Card, 1904 C.D. 383. The subject matter involved here is an absorption refrigerating machine of the inert gas type. The structure involved in this application and that disclosed in the Bergholm patent have been clearly and adequately described in the examiner's statement and need not be repeated here.

In general, the subject matter in dispute appears to center about the mechanism for causing exchange of heat between the hot gas, the hot weak liquor flowing from the generator and the comparatively cool strong liquor returning to the generator. In the patent these features have been incorporated in a unitary structure consisting of concentric pipes and is defined in claim 15 as "a triple heat exchanger" as used in claim 5, or "a heat exchanger" as used in claim 16, and like expressions used in claims 38 and 39 do not read on appellant's disclosure. Also difficulty has been encountered in attempting to apply the "surface level" as used in these claims to appellant's structure. As pointed out by the examiner in appellant's structure there are two surface levels in the generator-vapor lift assembly and not a single surface level as required by claim 16. As pointed out above, the expression "a triple heat exchanger" as used in claim 38 does not read on appellant's disclosure.

For reasons stated, the decision of the examiner is affirmed as to claims 15, 16, 38 and 39 and the appeal is dismissed as to claims 17, 18, 40 and 41.

Eugene Landers
Examiner-in-Chief

F. P. Edinburg
Examiner-in-Chief

C. H. Shaffer
Examiner-in-Chief

Board of Appeals

Mr. Harry S. Demaree
2300 Willoughby Tower
Chicago, Ill.
Oct. 6, 1941.

Appeal No. 39,111 MM

IN THE UNITED STATES PATENT OFFICE,

Before the Board of Appeals.

Ex parte Curtis C. Coons.

Application for patent filed January 10, 1941, Serial No. 373,970 for the reissue of patent No. 2,178,870 granted November 7, 1939. Continuous Absorption Refrigerating System.

Mr. Harry S. Demaree and Mr. Richard R. Fitzsimmons for applicant.

ON PETITION FOR RECONSIDERATION.

This petition is directed mainly to claim 39. The expression "heat exchange means", may be taken to read on appellant's structure, but this heat exchange means is in three parts and the part R is above not below the surface level of the generator-vapor lift assembly. When in operation it is almost impossible to state just where the liquid level is in the generator-vapor lift apparatus but the assumption of the examiner that it "is somewhere below the connection between the vapor lift pump 11 and said gas separator 5" appears to be correct. For reasons stated we are still of the opinion that claim 39 does not read on the disclosure in this case, and our former decision remains unchanged.

The petition has been granted to the extent indicated.

Eugene Landers
Examiner-in-Chief

F. P. Edinburg
Examiner-in-Chief

C. H. Shaffer
Examiner-in-Chief

Board of Appeals

Mr. Harry S. Demaree,
2300 Willoughby Tower
Chicago, Ill.
Oct. 17, 1941.

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May 21, 1940. H. K. BERGHOLM 2,201,362

REFRIGERATION

Filed Nov. 20, 1937 2 Sheets-Sheet 1

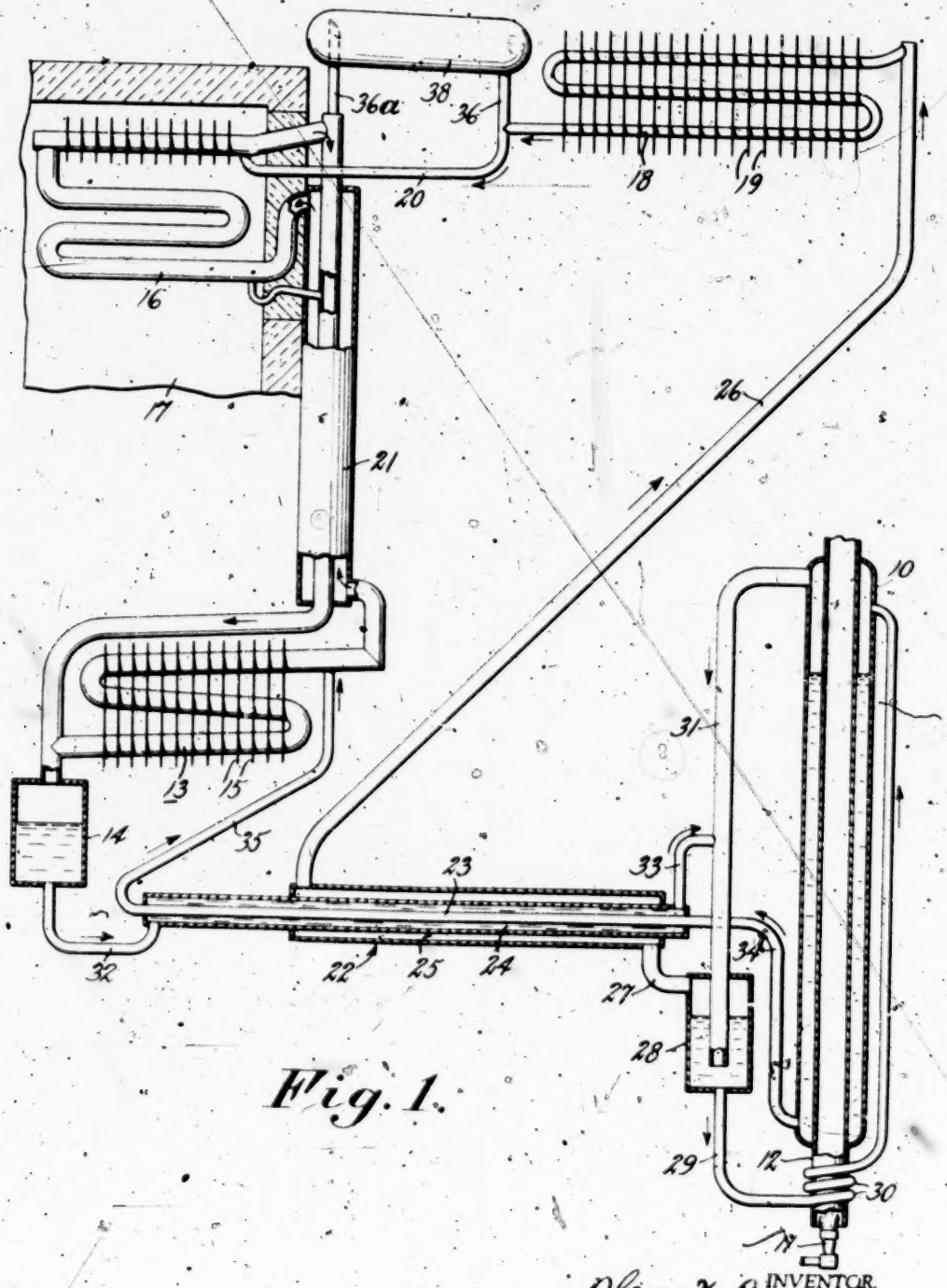

Fig. 1.

INVENTOR.
Harry K. Bergholm

BY

D. E. Heath
his ATTORNEY.

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May 21, 1940. H. K. BERGHOLM 2,201,362

REFRIGERATION

Filed Nov. 20, 1937 2 Sheets-Sheet 2

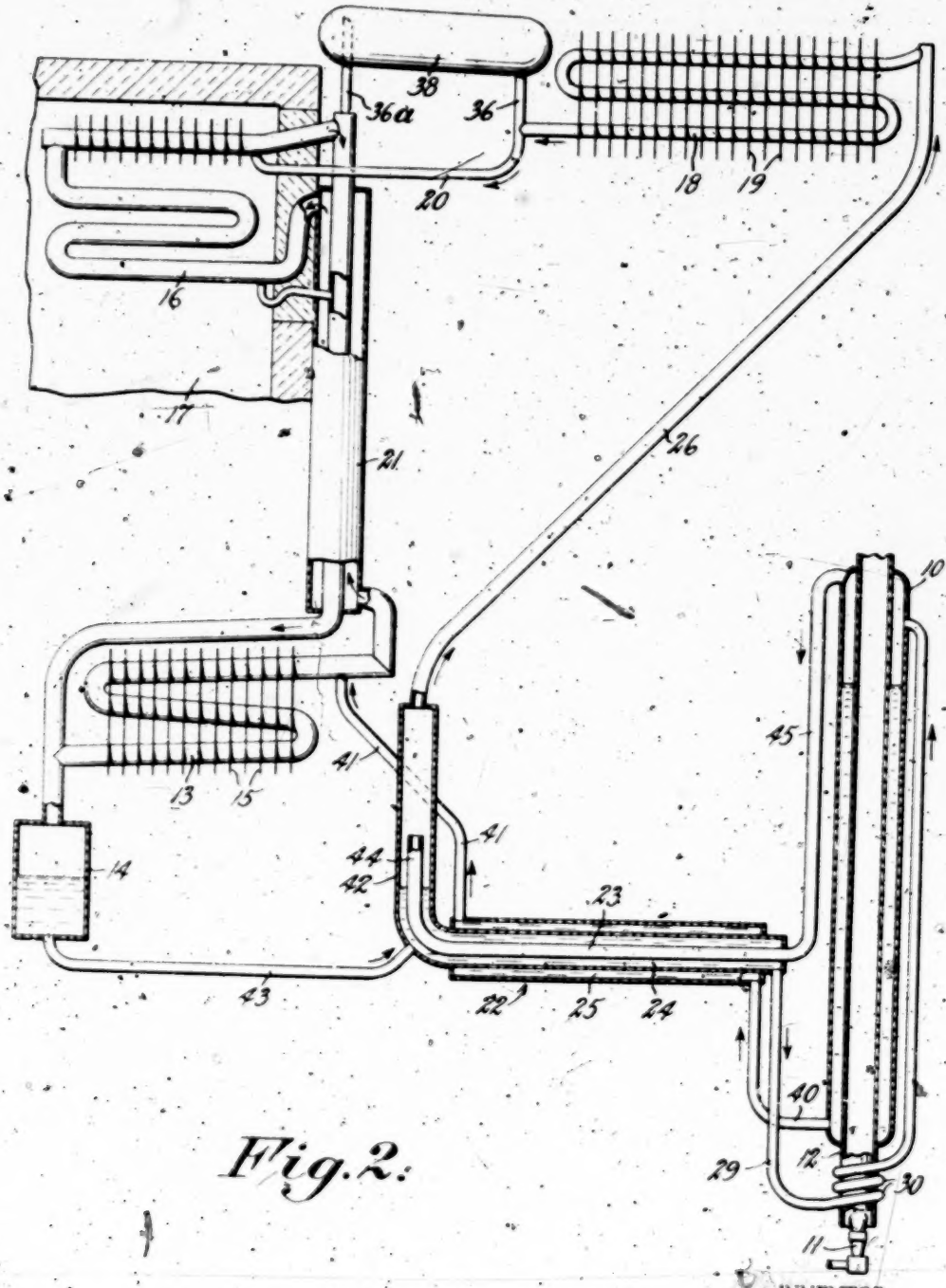

Fig. 2.

INVENTOR.
Harry K Bergholm

BY.

D. C. Gleath
his ATTORNEY.

CERTIFICATE OF CORRECTION.

Patent No. 2,201,362. May 21, 1940.

HARRY K. BERGHOLM.

It is hereby certified that error ~~appears in~~ the above numbered patent requiring correction as follows: In the heading to the printed specification, line 7, for "In Germany August 27, 1937" read --In Germany August 17, 1937--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of July, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

Patented May 21, 1940 2,201,362

UNITED STATES PATENT OFFICE

2,201,362

REFRIGERATION

Harry K. Bergholm, Stockholm, Sweden, assignor, by mesne assignments, to Servel, Inc., New York, N. Y., a corporation of Delaware

Application November 20, 1937, Serial No. 175,632
In Germany August 27, 1937

9 Claims. (Cl. 62—119.5)

My invention relates to an absorption type refrigeration system and it is an object of the invention to provide a system of this type having greater efficiency.

In the drawings:

Fig. 1 shows more or less diagrammatically the invention embodied in an absorption refrigeration system of a type making use of a pressure equalizing fluid; and

Fig. 2 shows a modification embodied in a system like that shown in Fig. 1.

Referring to Fig. 1, a generator 10 is heated by a suitable means such as a gas burner 11 arranged so that the burner flame projects into the lower end of a flue 12. An absorber comprises a conduit 13 and a liquid accumulation vessel or sump 14. The lower end of conduit 13 is connected to the upper part of vessel 14. Conduit 13 is provided with heat transfer fins 15 for cooling of the absorber by air. The absorber 13 may be cooled in any other suitable manner, as by a vaporization-condensation circuit or a water circulating coil.

An evaporator comprises a pipe coil 16 located in an insulated refrigerator compartment 17. A condenser comprises a pipe coil 18 provided with heat transfer fins 19 for cooling by air.

The lower part of condenser 18 is connected by a conduit 20 to the upper part of evaporator 16 for flow of condensed liquid refrigerant from the condenser to the evaporator. The evaporator 16 and absorber 13 are interconnected for circulation of inert gas therethrough and therebetween by conduits including a gas heat exchanger 21.

The absorber 13 and generator 10 are interconnected for circulation of absorption liquid therethrough and therebetween by conduits including a triple heat exchanger 22 and vapor flows from the generator 10 to the condenser 18 through conduits which also include the triple heat exchanger 22 as hereinafter described.

The triple heat exchanger 22 comprises an inner passage 23, a middle passage 24 and an outer passage 25. One end of the outer passage 25 is connected by a conduit 26 to the upper end of condenser 18. The other end of the outer passage 25 is connected by a conduit 27 to the upper part of a vessel 28. The lower part of vessel 28 is connected by a conduit 29 to the upper part of generator 10. Conduit 29 has a part formed as a coil 30 around the lower end of the generator heating flue 12. Conduit 29 forms a vapor liquid lift for raising liquid from vessel 28 into generator 10.

The upper end of a conduit 31 is connected to the upper part of generator 10. The lower end of conduit 31 extends into the lower part of vessel 28. One end of the middle passage 24 of the triple heat exchanger 22 is connected by a conduit 32 to the lower part of the absorber vessel 14. The other end of the middle heat exchanger passage is connected by a conduit 33 to conduit 31. The connection of conduit 33 to conduit 31 is made at a level above the bottom of absorber vessel 14 and below the lower end of the absorber conduit 13. The lower part of generator 10 is connected by a conduit 34 to one end of the inner passage 23 of the triple heat exchanger 22. The other end of inner passage 23 is connected by a conduit 35 to the upper part of the absorber coil 13.

The system contains a refrigerant fluid such as ammonia, an absorption liquid for the refrigerant such as water, and inert pressure equalizing gas such as hydrogen. The lower end of condenser 18 is connected by a conduit 36 to the gas circuit. Conduit 36 may be referred to as a vent conduit and includes a vessel 38 which serves as a storage chamber for gas, as known.

In operation, ammonia vapor, expelled by heating from solution in generator 10, flows through conduit 31, vessel 28, conduit 27, the outside passage 25 of the heat exchanger 22, and conduit 26 to the condenser 18. Ammonia vapor is condensed to liquid in condenser 18 and the liquid flows through conduit 20 into the upper end of evaporator 16. Liquid ammonia flows downward in evaporator 16 and evaporates and diffuses into hydrogen which flows upward in evaporator 16, producing a refrigerating effect.

Weakened absorption liquid flows from the lower part of generator 10 through conduit 34, inner passage 23 of the heat exchanger 22, and conduit 35 into the upper part of absorber 13. Absorption liquid flows downward in absorber 13 and absorbs ammonia vapor out of gas from the evaporator which flows upward in the absorber. Enriched absorption liquid flows from the lower end of conduit 13 into the sump 14. Enriched solution flows from the absorber vessel 14 through conduit 37, the middle passage 24 of the heat exchanger 22, conduit 33, and conduit 31 into vessel 28. From vessel 28 rich solution flows through conduit 29 into the generator 10, being raised through conduit 29 in a known manner by the lifting action of vapor formed by heating the solution in coil 30.

The level of liquid in generator 10 is high enough so that the described flow of weak solution from the generator to the absorber is caused

by overflow of liquid from the upper end of conduit 35 into the upper part of absorber coil 13. The level of rich solution in the absorber vessel 14 is high enough so that the described flow of rich solution from the absorber to the vessel 28 is caused by overflow of liquid from the upper end of conduit 33 into the descending vapor conduit 31. Conduit 29 is generally U-shaped with the descending leg connected to vessel 28 and the coiled portion 30 formed in the rising leg which is connected to the upper part of the generator. The level of liquid in vessel 28 is high enough so that the column of liquid in this vessel and the descending leg of conduit 29 balances the column of vapor and liquid in the right hand leg of conduit 29 with the rising column extending to the upper end of the rising leg of conduit 29 so that the liquid in this column flows into the upper part of the generator.

There are, thus, three levels of liquid in the system: An upper level in generator 10; an intermediate level in absorber vessel 14; and a lower level in vessel 28.

The lower end of conduit 31 may or may not extend below the level of liquid in vessel 28. If the lower end of conduit 31 is extended below the level of liquid in vessel 28, as shown, vapor from the generator will bubble upward through liquid in vessel 28. In such case vessel 28 may be referred to as an analyzer. The level of liquid in generator 10 will be lowered a distance depending upon the distance of immersion of the lower end of conduit 31 into liquid in the analyzer vessel 28.

In the triple heat exchanger 22, hot weak solution from the generator flows in the inner passage in counter-current to cooler strong solution from the absorber flowing in the middle passage and gives up heat to the latter. Vapors from the generator flowing in the outside passage 25 in counter-current relation to cooler strong solution in the middle passage 24 also give up heat to the latter. The heat transferred from generator vapors to the strong solution in the heat exchanger 22 may be referred to as heat of rectification. The efficiency of the system is increased because this heat comes from the generator and is returned to the generator with the strong solution. The transfer of heat of rectification is accompanied by condensation of water vapor in the outside passage 25 of the heat exchanger. The condensate formed in the outside passage 25 of the heat exchanger drains through conduit 27 into vessel 28 whence it is returned along with strong solution through conduit 29 to the generator, whereby the sensible heat in the condensate is also conserved.

In order to bring the generator vapors into heat exchange relation with solution flowing between the absorber and generator, the vapors are conducted to a level below the surface levels of liquid in the generator and absorber. In order to return to the generator water formed by condensation due to this heat exchange, I have introduced the further surface level of liquid in vessel 28 which is below the level at which condensation takes place so that the condensate may join the rich solution and be raised therewith above the heat exchanger.

In Fig. 2 the system is the same as that described in connection with Fig. 1, and in these figures like parts are indicated by the same reference numerals. In this modification, however, weakened absorption liquid flows from the lower part of generator 10 through a conduit 40, the outside passage 25 of the triple heat exchanger 22, and conduit 41 to the upper end of the absorber 13. The lower end of an upright conduit or standpipe 42 is connected to one end of the middle passage 24 of the heat exchanger. The other end of the middle passage 24 is connected to the descending leg of the vapor liquid lift conduit 29. The upper end of the standpipe 42 is connected to the lower end of conduit 26 which leads to the condenser 18. The lower part of the absorber vessel 14 is connected by a conduit 43 to the lower part of the standpipe 42. Within the standpipe 42 is a conduit 44. The upper end of this conduit is open and located in the upper part of the standpipe 42. The lower end of conduit 44 is connected to one end of the inner passage 23 of the heat exchanger 22. The other end of the inner passage 23 is connected by a conduit 45 to the upper part of generator 10.

Strong solution flows from the absorber through conduit 43, standpipe 42, the middle passage 24 of the heat exchanger 22, and conduit 29 to the generator. The level of liquid in the absorber vessel 14 is below the lower end of the absorber coil 13 but high enough so that the column of liquid in the descending leg of conduit 29 is sufficient to balance the rising column of gas and liquid in the rising leg of conduit 29 to the upper part of the generator. The level of liquid in the standpipe 42 is substantially the same as the level of liquid in the absorber vessel 14. The upper end of conduit 44 is open above this level of liquid in standpipe 42.

Vapors flow from the generator 10 through conduit 45, the inner passage 23 of the heat exchanger 22, conduit 44, the upper part of standpipe 42, and conduit 26 to the condenser 18. In the triple heat exchanger 22, heat is transferred from the weak solution in the outside passage 25 and the vapors in the inner passage 23 flowing counter-current to the cooler rich solution flowing in the middle passage 24. The inner passage 23 of the heat exchanger, and conduit 44 are made small in internal diameter so that water formed by condensation of water vapor in the heat exchanger 22, as previously described, will be swept along by the vapor and caused to flow upward in conduit 44 into the upper part of the standpipe 42. In the upper part of standpipe 42 the condensate is separated from the vapor and descends into the rich solution standing in the lower part of the standpipe 42, so that the condensate is thereby returned into the liquid circuit.

Other changes and modifications may be made within the scope of the invention which is not limited except as indicated in the following claims.

What is claimed is:

1. A method of refrigeration which includes expelling refrigerant from absorption liquid at a place of heating, liquefying the expelled refrigerant, evaporating the liquefied refrigerant, absorbing the evaporated refrigerant into absorption liquid, flowing vapors from said place of heating and liquid to said place of heating in heat transfer relation out of physical contact at a place of heat exchange to cause rectification by condensation of vaporous absorption liquid and conservation of latent heat of rectification by return thereof in the liquid to said place of heating, and utilizing said vapors flowing from the place of heating to cause the condensate to rise above said place of heat exchange in a path of flow returning to said place of heating for conservation of the sensible heat in the condensate.

2. A refrigeration system containing refrigerant and a liquid absorbent for the refrigerant and having a place of heating for causing expulsion of refrigerant from absorption liquid, a place of heat exchange, means to conduct vapors from said place of heating and liquid to said place of heating in heat transfer relation out of physical contact at said place of heat exchange to cause rectification by condensation of vaporous absorption liquid and conservation of the latent heat of rectification by return thereof in the liquid to said place of heating, and means utilizing flow of said vapors from the place of heating to cause the condensate to rise above said place of heat exchange for return to said place of heating to conserve the sensible heat in the condensate.

3. A refrigeration system as set forth in claim 2 which also has means to conduct liquid from said place of heating in thermal exchange relation at said place of heat exchange with liquid flowing to said place of heating.

4. A refrigeration system as set forth in claim 2 which also has means to conduct liquid from said place of heating in heat transfer relation at said place of heat exchange with liquid flowing to said place of heating, and vapor lift means for effecting the flow of liquid.

5. An absorption refrigeration system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, means for causing flow of liquid in said circuit, and means utilizing flow of vapor through said heat exchanger for causing condensate formed in the vapor portion of the heat exchanger to be raised for return flow to said generator.

6. Absorption refrigeration apparatus as set forth in claim 5 in which said means for causing flow of liquid in said circuit is a vapor liquid lift.

7. An absorption refrigeration system having a circuit for absorption liquid including a generator, an absorber, and a triple heat exchanger, said exchanger being connected to conduct vapors and liquid from the generator and liquid flowing to the generator in heat transfer relation out of physical contact with each other, said exchanger also being located at a level below the surface levels of liquid in both said generator and said absorber, and means for creating a third surface level of liquid in said circuit below said heat exchanger to permit drainage of condensate from the vapor portion of said heat exchanger into said liquid circuit.

8. An absorption refrigeration system as set forth in claim 7 in which vapors conducted from the generator to the heat exchanger pass in physical contact with absorption liquid flowing from said heat exchanger to said generator.

9. An absorption refrigeration system as set forth in claim 7 in which vapors flowing from said generator to said heat exchanger bubble through absorption liquid below said third surface level.

HARRY K. BERGHOLM.

[fol. 140] Friday, April 7th, A. D., 1944.

Before Honorable Justin Miller, Henry W. Edgerton, and Thurman Arnold, Associate Justices.

No. 8602, April Term, 1944

THE HOOVER COMPANY, Appellant,

vs.

CONWAY P. COE, Commissioner of Patents, Appellee

Argument commenced by Mr. Richard R. Fitzsimmons, attorney for appellant, continued by Messrs. William D. Sellers, attorney for appellant, and R. F. Whitehead, attorney for appellee, and concluded by Mr. William D. Sellers, attorney for appellant. The Court requested each side to file as soon as possible and not later than fifteen days, a memorandum on the question has the Court under Section 4915 the power to hand down a decree which does not determine the right of an applicant to receive a patent but which only determines that claims which may subsequently be held to be unpatentable by the Patent Office are supported by the application.

[fol. 141] [Stamp:] United States Court of Appeals for the District of Columbia. Filed Jul. 10, 1944. Joseph W. Stewart, Clerk

UNITED STATES COURT OF APPEALS, DISTRICT OF COLUMBIA

No. 8602

THE HOOVER COMPANY, Appellant,

v.

CONWAY P. COE, Commissioner of Patents, Appellee

Appeal from the District Court of the United States for the District of Columbia

Argued April 7, 1944. Decided July 10, 1944

Messrs. Richard R. Fitzsimmons and *William W. Sellers*, with whom *Mr. William S. Hodges* was on the brief, for appellant.

Mr. R. F. Whitehead, with whom *Mr. W. W. Cochran*, Solicitor, United States Patent Office, was on the brief, for appellee.

Before Miller, Edgerton and Arnold, Associate Justices

ARNOLD, *Associate Justice:*

Both parties to this suit claim that the sole issue involved is whether the patent claims set out in the complaint are supported by plaintiff's application. One of these claims has been copied from another patent. Others are substantially the same as the claims in the second patent, yet all of them were formulated for the express purpose of provoking interference proceedings in the Patent Office. All were rejected on the sole ground that they did not read on the disclosure of plaintiff's application. In substance this meant that the Patent Office did not consider the patent with which plaintiff hoped to provoke an interference sufficiently similar to the patent from which the claims were copied to justify interference proceedings.

Counsel for both parties admit that if plaintiff's claims are allowed the court will be unable to declare that plaintiff is entitled to a patent because the record does not show whether plaintiff made the prior discovery. The only result will be to overrule the administrative decision that interference proceedings are not justified. The case will then be sent back to the Patent Office to determine priority. The complaint itself does not ask the court to adjudge that plaintiff is entitled to a patent. The only relief requested is a decree directing the Commissioner of Patents to find the claims are readable on plaintiff's disclosure and allowable to him provided that he later is determined to have priority. [fol. 142] On its own motion this court raised the question whether Section 4915 R. S. confers jurisdiction on the District Court to enter a decree which does not determine the right of the applicant to receive a patent but which instead directs the examiner to allow claims for the purpose of provoking subsequent interference proceedings. Both parties submitted memoranda of authority supporting the jurisdiction of the District Court in the above situation.

In the absence of controlling decisions it would seem clear from the statute that the District Court had no jurisdiction over this suit. The language of Section 4915 R. S. gives the court authority to adjudge that an applicant is entitled

according to law to receive a patent for his invention as specified in his claim, or any part thereof, as the facts in the case may appear. Such an adjudication cannot be made in this case. Before plaintiff here is entitled to a patent it must establish priority over the patent from which the claims are copied. Such priority cannot be determined here for two reasons: (1) The party against whom the plaintiff claims priority is not before the court; (2) There has been no decision of priority by the Board of Interference Examiners. The statute clearly indicates that the issue of priority can be heard in a suit in equity only when a patent has been refused by the Board of Appeals of the Patent Office or when the plaintiff is dissatisfied with a decision of the Board of Interference Examiners.

In substance, this case is not a suit on the merits but an appeal from the refusal of the Patent Office to take preliminary steps which would lead to interference proceedings. Sections 4911 and 4914 R. S. give the United States Court of Customs and Patent Appeals jurisdiction to correct an administrative ruling of the Patent Office for error appearing on the Patent Office record. Nothing in Section 4915 R. S. indicates that a suit in equity tried on new evidence is a duplicate method of reviewing an administrative ruling in a case where the plaintiff's right to a patent cannot be determined. Furthermore, considerations of sensible and orderly procedure are against this construction. The idea that a court of equity should interfere with the proceedings of an administrative tribunal by a trial de novo at a stage when no decision on the merits can be given is contrary to the fundamental concept of equity jurisdiction.

Turning now to the cases we find an explicit ruling by the Supreme Court that a proceeding under Section 4915 R. S. cannot select a single issue which affects plaintiff's right to a patent, without determining all the other issues on which that right depends. The Court said:

> "The provision of section 4915 is that the circuit court may adjudge that the applicant 'is entitled, according to law, to receive a patent for his invention, as specified in his claim, or for any part thereof, as the facts in the case may appear;' and that, if the adjudication is in favor of the right of the applicant, it shall authorize the commissioner to issue the patent. *It necessarily follows that no adjudication can be made*

in favor of the applicant, unless the alleged invention for which a patent is sought is a patentable invention. The litigation between the parties on this bill cannot be concluded by solely determining an issue as to which [fol. 143] *of them in fact first made a cabinet creamery.* A determination of that issue alone, in favor of the applicant, *carrying with it, as it does, authority to the commissioner to issue a patent to him for the claims in interference*, would *necessarily* give the sanction of the court to the patentability of the invention involved." (Italics added.)[1]

Our own decision in *Radtke Patents Corporation* v. *Coe*[2] is to the same effect.

In the case before us we cannot determine plaintiff's right to a patent because it involves deciding that he is prior in time to another applicant who is not a party to the suit. Since the court cannot decide the whole controversy on its merits we have no jurisdiction over the intermediate proceedings in the Patent Office.[3]

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[1] *Hill* v. *Wooster*, 132 U. S. 693, 698 (1890).

[2] 74 App. D. C. 251, 122 F. (2d) 937 (1941). In *Butterworth* v. *United States ex rel. Hoe*, 112 U. S. 50, 61 (1884), it was indicated that the record in a suit under Section 4915 R. S. should include the whole merits of the applicant's right to a patent. The court said: "It is thereby provided (referring to R. S. 4915) that the applicant may have remedy by bill in equity. This means a proceeding in a court of the United States having original equity jurisdiction under the patent laws, according to the ordinary course of equity practice and procedure. It is not a technical appeal from the Patent Office, like that authorized in Section 4911, confined to the case as made in the record of that office, but it is prepared and heard upon all competent evidence adduced *and upon the whole merits*. Such has been the uniform and correct practice in the circuit courts. Whipple v. Miner, 15 Fed. Rep. 117; ex parte Squire, 3 Ban. and A., 133; Butler v. Shaw, 21 Fed. Rep. 321." (Parenthetical matter and italics added.)

[3] Cf. *Synthetic Plastics Co.* v. *Ellis-Foster Co.*, 78 F. (2d) 847 (C. C. A. 3rd, 1935); *Cherry-Burrell Corp.* v. *Coe*, No. 8487 (decided June 19, 1944).

The notion that an equity suit under Section 4915 R. S. gave jurisdiction to authorize the issuance of a patent to a party where the issue of priority could not be determined stems from the case of *Pitman* v. *Coe*. In that case the Commissioner moved to dismiss a proceeding under Section 4915 R. S. because the denial of plaintiff's claim by the Patent Office was based on improper joinder of claims in one application. The Commissioner argued that, since patentability was yet to be determined, the order refusing the claims was interlocutory and not final. No question of priority was involved and all the necessary parties were before the court. The court declared that the refusal of a patent claim based on an order of division could be reviewed by a suit in equity. The prayer of the complaint asked for the issuance of a patent and not for a limited review of the order of division by itself. It is, therefore, not clear from the decision whether the court thought that the District Court had authority to review the single question of division and send the case back to the Patent Office for determination of patentability or whether it considered the trial court had the power to conduct an original hearing on patentability. If the decision be construed as holding that the issue of patentability need not be decided in a Section 4915 R.S. proceeding it is inconsistent with the Supreme Court's ruling in *Hill* v. *Wooster* and has been overruled by our decision in *Radtke Patents Corp.* v. *Coe*. If it be construed as authorizing the District Court to decide the question of patentability before the Patent Office has determined that issue, it sets forth a highly questionable doctrine which [fol. 144] in effect transfers to the court the duty of the Patent Commissioner [5] to make an original expert investigation of the prior art. But even if we followed the dubious course of allowing the District Court to make an original investigation of priority before the Patent Office acted, there would be no jurisdiction here because the holder of the interfering application or patent would be an indispensable party.[6]

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[4] 62 App. D. C. 365, 68 F. (2d) 412 (1933).

[5] Section 4904 R. S.

[6] *Hazeltine Corp.* v. *White*, 68 F. (2d) 715 (C. C. A. 2d, 1934).—That case was a suit by a losing party in a multiple interference proceeding, brought against the successful interferent. It was held that the other losing interferents

Appellant asserts that this court has tacitly approved administrative review of Patent Office rulings under Section 4915 R. S. in cases where the record showed that the claims involved were copied from other patents or applications to provoke interference proceedings. It cites the cases of *International Celluvotton Products Co.* v. *Coe*[7] and *American Cyanamid Co.* v. *Coe*.[8] Those cases involved the refusal to grant claims copied from another patent. Nevertheless, the mandate directed the Patent Office to issue a patent to the plaintiff. The Patent Office was unable to comply because priority had not been determined. The mandate was, therefore, ignored and interference proceedings were instituted after our decision. The question of jurisdiction was not raised by the Patent Office or considered by this court. Our attention was not called to the fact that the mandate in favor of plaintiff's right to a patent could not be carried out. Instead of supporting jurisdiction the unforeseen results of these cases illustrate the inappropriateness of an independent suit in equity to determine the correctness of an intermediate ruling in the Patent Office.

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were indispensable parties to a suit under Section 4915 R. S. The court said, at page 717: "Only in the sense that a decree in this suit would be futile to establish the right of any one to a patent, on the assumption that the Commissioner would not be authorized to issue it, can it be said that a decree can be made which does not affect the interests of the absent adverse parties, * * * A decree which did authorize the Commissioner to issue the patent would ignore the right of the absent adverse parties to be heard, and leave the controversy in such a condition that its final determination might be contrary to fundamental principles of equity and good conscience."

If, as the statute requires, this court were to issue a decree adjudging that the plaintiff is entitled to the claims in issue, it would likewise "ignore the right of the absent adverse parties to be heard". That the rival claimant is an adverse party and that the issue of readability may be the most crucial one in his case is illustrated by *Smith* v. *Carter Carburetor Corp.*, 130 F. (2d) 555 (C. C. A. 3rd, 1942).

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[7] 66 App. D. C. 248, 85 F. (2d) 869 (1936).

[8] 70 App. D. C. 330, 106 F. (2d) 851 (1939).

They present a procedure in which a court of equity makes a declaratory judgment on a record which compels the Patent Office to ignore the terms of that judgment.

Doubtless the failure of this court to notice the lack of jurisdiction in the cases above referred to was due to the artificial form in which they were presented. Theoretically each patent claim is a distinct invention. Therefore, the refusal of any single claim appears in the pleadings under Section 4915 R. S. as the refusal of a patent on a distinct invention. Actually, however, in applications containing multiple claims the claims often do not represent distinct inventions but only different ways of describing a single invention. This is particularly true when claims are copied [fol. 145] to be used as counts in an interference. The purpose of such copied claims is not to claim distinct inventions but to compare similar single inventions detail by detail. This method of limiting or enlarging the scope of a single invention through the device of multiple claims should be recognized for what it is,—an administrative method by which the Patent Office clarifies the issues in an interference proceeding. The fact that the Patent Office uses an artificial conception of the phrase "distinct invention" should not be made a vehicle to enlarge the jurisdiction of this court to include appeals which may properly be taken only to the United States Court of Customs and Patent Appeals.

For these reasons the judgment of the court below dismissing the complaint will be

Affirmed.

[fol. 146] [Stamp:] United States Court of Appeals for the District of Columbia. Filed Jul. 10, 1944. Joseph W. Stewart, Clerk

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA, APRIL TERM, 1944

No. 8602

THE HOOVER COMPANY, Appellant,

vs.

CONWAY P. COE, Commissioner of Patents, Appellee

Appeal from the District Court of the United States for the District of Columbia

JUDGMENT

This cause came on to be heard on the transcript of the record from the District Court of the United States for the District of Columbia, and was argued by counsel.

On consideration whereof, It is now here ordered and adjudged by this Court that the judgment of the said District Court appealed from in this cause be, and the same is hereby, affirmed.

Per Mr. Justice Arnold.

Dated July 10, 1944.

[fol. 147-148] [Stamp:] United States Court of Appeals for the District of Columbia. Filed Jul. 26, 1944. Joseph W. Stewart, Clerk

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA

No. 8602

THE HOOVER COMPANY, Appellant,

v.

CONWAY P. COE, Commissioner of Patents, Appellee

DESIGNATION OF RECORD

The Clerk will please prepare a certified transcript of record for use on petition to the Supreme Court of the

United States for writ of certiorari in the above-entitled cause, and include therein the following:

1. Appendix to appellant's brief. Appendices to briefs of the parties.
2. Minute entry of argument.
3. Opinion.
4. Judgment.
5. * [Minute entry of denial of petition for rehearing.]
6. This designation.
7. Clerk's certificate.

Richard R. Fitzsimmons, W. D. Sellers, Attorneys for Appellant.

Wm. S. Hodges, of Counsel.

Service of a copy of the above Designation of Record acknowledged this 26th day of July, 1944.

W. W. Cochran, of Counsel for Appellee.

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* Matter inclosed in brackets, struck out in copy.

[Tol. 149] Supreme Court of the United States.

Order Allowing Certiorari—Filed November 6, 1944

The petition herein for a writ of certiorari to the United States Court of Appeals for the District of Columbia is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.